A STUDY TO ASSESS THE EFFECTIVENESS OF COMPUTER ASSISTED INSTRUCTION ON KNOWLEDGE AND ATTITUDE REGARDING HAZARDS OF USE OF PLASTIC PRODUCTS AMONG THE SCHOOL CHILDREN AT SELECTED RURAL SCHOOLS, THANJAVUR ,DT

BY

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A DISSERTATION SUBMITTED TO THE TAMILNADU Dr. M.G.R.MEDICAL UNIVERSITY, CHENNAI – 32 IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN NURSING

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OCTOBER – 2015

CERTIFICATE

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DECLARATION

I hereby declare that this dissertation entitled "**A Study To Assess The Effectiveness Of Computer Assisted Instruction On Knowledge And Attitude Regarding Hazards Of Use Of Plastic Products Among The School Children At Selected Rural Schools, Thanjavur ,Dt,"** outcome of the original research work undertaken and carried out by me, under the guidance of research guide **Prof. Mrs. VANITHA INNOCENT RANI, M.Sc (N), Ph.D.,** Professor cum Principal, and **Mrs. AMBIKA, M.Sc (N),** HOD for Child Health Nursing Department, Our Lady of Health College of Nursing, Thanjavur,Dt.

I hereby declare that the material of this has not found in any way, the basis for the award of any degree / diploma in this university or any other university.

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5.	Certificate for English and Tamil editing.
6.	Research tool.
7.	Computer Assisted Instruction
8.	Soft copy of the study.

LIST OF ABBREVIATIONS

SHORT FORMS	ABBREVIATIONS
Dt	District
CAI	Computer Assisted Instruction
H_1	Research Hypothesis
M.Sc. (N)	Master Of Science in Nursing
No	Number
N	Number of samples
F	Frequency
%	Percentage
SD	Standard Deviation
χ^2	Chi-square
Fig	Figure
*	Significant
HOD	Head of The Department
BPA	Bisphenol –A
LDPE & HDPE	Low Density Polyethylene & High Density Polyethylene.
FDA	Food and Drug Administration.

ABSTRACT

In the modern society plastic products are used day to day life , they are made up of some harmful chemicals they leaches in the environment and human health ,causing ill effects. The study focuses on effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the rural school children, Thanjavur ,Dt. The statistical analysis revealed that the knowledge and attitude of the experimental group was calculated by the paired 't' test for knowledge ('t'= 24.11) and for attitude ('t'=16.00). Where as in control group the knowledge level was ('t'=1.83) and for attitude ('t'=1.12). This proves that there is a significant difference in pre test and post test level of knowledge and attitude of the experimental group at 0.05 level. Where as in correlation between the post test scores of knowledge and attitude of the experimental and control group states the 'r' value (r=0.8) it revealed that there is a positive and highly significant correlation between the knowledge and attitude regarding hazards of use of plastic products in control group the 'r' value (r=0.3) it reveals that there is a positive and moderate significant correlation between the knowledge and attitude regarding hazards of use of plastic products. It indicated that the given CAI was effective.

CHAPTER -I

INTRODUCTION

CHAPTER- I

INTRODUCTION

" AN OUNCE OF PREVENTION IS

WORTH A POUND OF CURE "

- *Benjamin Franklin.*

BACKROUND OF THE STUDY

In modern era , Plastic is an inevitable substance, has become a part of every aspect of human living . It is one of the major toxic pollutants of our time. Plastics are widely used in the world because of their light weight ,cheap ,easy process of manufacturing .durability .strength and availability in all forms. Chemical diversity, abundance and hazardousness are one of the major environmental challenges of today. On the contrary to biological diversity, chemical diversity can be problematic from an environmental point of view. There is not sufficient knowledge to provide protection for human health and the environment against all these chemicals, which according to the European Inventory of Existing Commercial Chemical Substances (EINECS).

Plastics are typically polymers of high molecular weight, Polyethylene, Polyvinylchloride , Polystyrene are largely used in the manufacture of plastics, and may contain other substances like Bisphenol-A , Phethelets to improve the performance and reduce costs.

Bisphenol A (BPA) is an industrial chemical that has been present in many hard plastic bottles and metal-based food and beverage cans since the 1960s. Bisphenol A (BPA) is the molecular building block for Polycarbonate.

plastics and epoxy resins. U.S. Production of BPA grew rapidly from 16 million Pounds in 1991 to about 2.3 billion pounds in 2004,Making it one of the most produced chemicals in the World .

Infants are potentially sensitive population for BPA because their neurological and endocrine systems are developing; and their hepatic system for detoxification and elimination of such substances as BPA may be immature**. FDA** is supporting the industry's actions to stop producing BPA-containing bottles and infant feeding cups for the U.S market. FDA understands that the major manufacturers of these products have stopped selling new BPA-containing bottles and infant feeding cups for the U.S. market. Glass and polypropylene bottles and plastic disposable "bag" liners have long been alternatives to polycarbonate nursing bottles.

Phthalates 234 are "plasticizers" used to produce diverse products, including food and beverage packaging materials, and adhesives. Phthalates are additives that give plastics like polyvinyl chloride (PVC) properties such as flexibility and stress resistance.

NEED FOR THE STUDY

"Awareness is like the sun .

When it shines on the thing ,

They are transformed"

- *Thich Nhat Hanh*

Plastic have produced every day life, usage of plastic increased and annual production is likely 300 million tonnes by 2010. However ,concerns about usage and disposal are divers include accumulation of plastic in the landfill and in the natural habitats , physical problem for wildlife resulting from ingestion or entanglement of plastic , the leaching of chemicals from plastic

products and the potential for plastics to transfer chemicals to wildlife and humans.

The Times of India (2013) reported that **Central Pollution Control Board** informed it that India generates 56 lakh tonnes of plastic waste annually, with Chennai 429.4 tonnes per day,

Table – 1.1 Represents the statistical data of plastic waste generated in different states in India.

STATE	PLASTIC WASTE / PER DAY / TONNES
Delhi	689.4
Chennai	429.4
Kolkata	425.7
Mumbai	408.3

Plastics constitute a large material group with a global annual production that has doubled in 15 years (245 million tonnes in 2008). Plastics are present everywhere in society and the environment, especially the marine environment, where large amounts of plastic waste accumulate.

With respect to the health effects, the plasticizers leaches in to the food products they are major concerns in the health effects among the children and adult. **The National Toxicology Program at the National Institutes of Health and FDA** have concerns about the potential effects of BPA on the brain, behaviour, and prostate gland in foetuses , infants and young children. The new estimate of average dietary exposure, is 0.2-0.4 micrograms/kg-bw/day for infants and 0.1-0.2 micrograms/kg-bw/day for children and adults.

Donna Eng,M.D., C.S.Mott Children's Hospital, defined as a BMI above the 95th percentile on Centres for Disease Control and Prevention growth

curves ,was associated with the higher levels of urinary BPA .Children with higher levels of BPA also were more likely to have an abnormal waist circumference –to- height ratio.

Sakthivel .S et al ., (2015) stated that a few earlier studies have associated exposure to endocrine-disrupting chemicals (EDCs) with childhood obesity. There is limited information, however, on exposure to EDCs and childhood obesity in India. In this study, urinary levels of 26 EDCs were determined in 49 obese and 27 non-obese Indian children. Urinary concentrations of several EDCs were higher in Indian children than the concentrations reported for children in the USA and China.

Michels—who also is associate professor of gynaecology, obstetrics, and reproductive biology at **Harvard Medical School, Brigham and Women's Hospital**—and her colleagues had followed 77 Harvard College students over a two-week period. The students drank cold beverages from stainless steel bottles one week and from polycarbonate bottles the other week. Urine samples showed a 69 % increase in BPA levels during the polycarbonate week.

An **Environmental Health Perspectives** report published online October 6, drawing on data from 249 mothers and their children in Cincinnati, Ohio, associated prenatal BPA exposure with more aggressive and hyperactive behaviour in girls at age 2.

Annual Review of Public Health (2010),said that by 2010, the worldwide annual production of plastics will surpass 300 million tons. Plastics are indispensable materials in modern society, and many products manufactured from plastics are a boon to public health (e.g., disposable syringes, intravenous bags). However, plastics also pose health risks. Of principal concern are endocrine-disrupting properties, as triggered for example by bisphenol A and di-(2-ethylhexyl) phthalate (DEHP).

PROBLEM STATEMENT

A study to assess the effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the school children at selected rural schools, Thanjavur ,Dt.

OBJECTIVES

- To assess the knowledge and attitude regarding hazards of use of plastic products among the rural school children in experimental and control groups.
- To evaluate the effectiveness of Computer Assisted Instruction regarding the hazards of use of plastic products among the rural school children in experimental group.
- To compare the pre and post test levels of knowledge and attitude between the experimental and control group regarding hazards of use of plastic products among the rural school children.
- To correlate the post test scores of knowledge and attitude of rural school children regarding the hazards of use of plastic products among the rural school children in experimental and control groups.
- To determine the association between the pre test level of knowledge and attitude regarding the hazards of use of plastic products among the rural school children and their selected demographic variables in experimental and control groups.

HYPOTHESES

All the hypotheses were tested at $p< 0.05$ level of significance.

H_1:There will be a significant difference between the pre test and post test levels of knowledge and attitude regarding hazards of use of plastic products

among the rural school children in experimental and control groups.

H_2: There will be a significant difference in the levels of knowledge and attitude between the experimental and control groups regarding hazards of use of plastic products among the rural school children.

H_3:There will be a significant correlation between the knowledge and attitude regarding hazards of use of plastic products among the rural school children in experimental and control groups.

H_4: There will be a significant association between the pre test level of knowledge and attitude regarding hazards of use of plastic products use among the rural school children and their selected demographic variables in experimental and control group.

OPERATIONAL DEFINITION

EFFECTIVENESS

In this study, it refers to the extent to which the Computer Assisted Instruction influences in improving the knowledge and attitude regarding hazards of use of plastic products among the rural school children.

COMPUTER ASSISTED INSTRUCTION

In this study ,it refers to the planned teaching strategies regarding the hazards of use of plastic products with the help of computer to educate the rural school children .

KNOWLEDGE

In this study ,it refers to the information acquired by the rural school children about the hazards of plastic products use which was measured by using semi structured self-administered questionnaire.

ATTITUDE

In this study ,it refers to the perception & belief towards the hazards of use of plastic products among the rural school children which was measured using Likert scale.

SCHOOL CHILDREN

In this study ,it refers to the children who were studying in eighth standard in the schools.

RURAL SCHOOL

In this study ,it refers to the schools located in a geographic area that was at least 5 kms far away from the city.

HAZARDS OF USE OF PLASTIC PRODUCTS

In this study ,it refers It refers to the ill effects caused by the usage of plastic items which affect the environment and health of the human beings especially children and resulting in many problems such as water pollution ,soil pollution ,acute respiratory disease, poor immune response, precocious puberty ,infertility, obesity etc.

ASSUMPTIONS

- The use of plastic items may cause ill effects to environment and human health.
- The rural school children may not aware of hazards of plastic products usage.
- The computer assisted instruction will help to improve the knowledge and positive attitude regarding hazards of use of plastic products among the rural school children.

DELIMITATIONS

- The study was limited to rural school children between the age group of 13- 15 years.
- The data collection period was limited to 6 weeks .

PROJECTED OUTCOME:

- The computer assisted instruction may help to minimize the use of plastic items by the rural school children to prevent its hazards.
- The computer assisted instruction will help to improve the knowledge and positive attitude regarding hazards of use of plastic products among the rural school children.

CHAPTER – II

REVIEW OF LITERATURE

CHAPTER –II

REVIEW OF LITERATURE

A literature review is a text written by someone to consider the critical points of current knowledge including substantive findings, as well as theoretical and methodological contribution to a particular topic . Review of literature is the reading and organizing of previously written materials relevant to the specific problems to be investigated ; frame work and methods appropriate to perform the study.

PART I – Theoretical Frame Work.

Section –A : Theoretical review.

Section –B : Empirical review.

(i) Reviews related to hazards of plastic use to human health.

(ii) Reviews related to hazards of plastics to environment.

PART II – Conceptual Frame Work.

PART –I THEORETICAL FRAME WORK.

SECTION –A : THEORETICAL REVIEW.

PLASTIC AN OVERVIEW

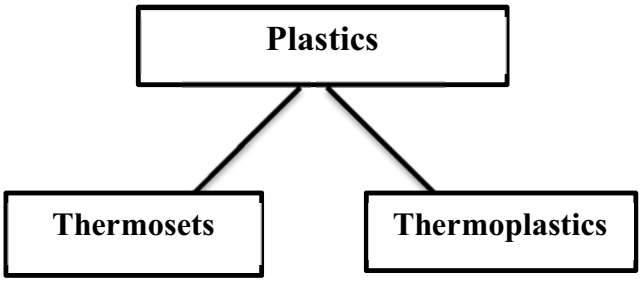
The word plastic derives from the Greek word (plasticos) means fit for moulding and (plastos) meaning moulded. It refers to their malleability or plasticity during manufacture that allow them to be cast , pressed or extruded into on enormous Variety of shapes plats , tubes, bottles ,boxes and much more.

Plastic are typically polymers of high molecule weight , and may contain other substances to improve the performance and reduce costs. Plastics takes more time to degraded, they may also pollute the environment and affect our health.

HISTORY OF PLASTICS

The first human made plastic was invented by Alexander Parkes in 1855 . He called this plastic parkesine later called celluloid . the development of plastics has come from the use of natural plastic materials (e.g chewing gum) to the use of chemically modified natural materials (e.g rubber) and finally to c completely synthetic molecules (e.g, polyvinyl chloride.) make up the polymers backbone and side chain .

TYPES OF PLASTICS



THERMOPLASTIC : Thermoplastics will soften and melts if enough heat is applied . (eg, Polyethylene, polystyrene)

THERMOSETS : Thermosets do not soften or melt no matter how much heat is applied. (eg, Polyester, Amino ,Epoxies , Phenolic, Polyimides, Polyurethane, silicone.

THERMOSET PLASTIC TYPES

ALKYDS: Alkyds are chemically modified alkyd resins are the condensation products of poly basic acids and Polyhydric alcohols. They are also oil-modified polyesters because of the presence of vegetable or marine oil or other fatty acids. They are used in the architectural coating ,automotive under body and under- hood coting ,coil coatings , drum, and metal container coating ,electrical industry ,paints.

UREA FORMALDEHYDE &MELAMINE FORMALDEHYDE / AMINO: Urea formaldehyde are strong ,glossy and durable. They are high mechanical strength ,fire, heat resistance ideal numerous industrial and household application .

EPOXIES: Epoxy resins are low molecular weight polymers or higher molecular weight . The application for epoxy based materials are extensive and include coatings, adhesives, electrical insulating paints and coating.

PHENOLICS: The phenolic are combined formaldehyde and phenol .The material called Bakelite . They are water and solvent resistant , could be used as electrical insulator , electronics and telephones ,radios ,records.

PLOYMIDES: Polyimides are the macromolecule with repeating units of linked by amino bonds when compared to most other organic or polymeric exceptional combination of thermal stability, mechanical toughness chemical resistance used in aircraft parts , wear ships, thrust washers .

POLYURETHENE : They are durable elastomers and high performance adhesives and sealants ,fibres, seats , gaskets also called as urethanes.

SILICONE : Silicone are polymers that include any inert ,synthetic compound made up of reparative units of Silicones. They are typically heat 2resistance and rubber-like and are used in sealants ,adhesives, lubricants medicine cooking utensils and thermal and electrical insulation.

THERMOPLASTICS

POLYVINYL CHLORIDE(PVC): PVC has side chains incorporating chlorine atoms, which form strong bonds . PVC can also be softened with chemical processing ,and in this form it is now used for shrink –wrap , food packaging and rain gear.

POLYSTYRENE: Polystyrene is a rigid ,brittle inexpensive plastic that has been used to make plastic model kits and similar knick – knocks .It would

also be the basis for one of the most popular “foamed” plastics ,under the name styrene foam or Styrofoam.

NYLON : Nylon are the very strong ,nylon can be machined and will take a fine thread .It is also slippery and can be used to make washers , spacers and bushes. Nylons are easy to mould . Nylon are used for everything form clothes through to gears and bearings.

POLYETHYLENE:(LDPE&HDPE) Some times known as polythene , was discovered in 1933 by Reginald Gibson and Eric Fawcett at the British Industrial Giant Imperial Chemical Industries . The most common polymer in plastic is polyethylene , which is made from ethylene monomers (CH2=CH2).Today ,we call is low density polyethylene and high density polyethylene . Polyethylene are cheap flexible durable, and chemically resistance LDPE is used to make films and packaging materials ,while HDPE is used for containers ,plumbing and automotive fitting .

POLYPROPYLENE : In 1953 Karl Ziegler and Giulio Natta , Working independently ,prepared polypropylene from propylene monomers CH2=CHCH3) and received the Nobel Prize in chemistry in 1963. The various forms of polypropylene have different melting points and hardness. Polypropylene is similar to its ancestor ,polyethylene and shares polyethylene’s low cost ,but is much more robust .It is used in everything from the plastic bottles to carpets to plastic furniture ,and is very heavily.

POLYETHYLENE TERPHTHALATE : John Rex Whinfield invented a new polymer in 1941 when he condensed ethylene glycol with terephthalate acid . The condensate was polyethylene terephthalate . PET is a thermoplastic that can be drawn into fibres and films .It’s the main plastic in zip lock food storage bags.

TEFLON: Teflon was made in 1938 by DuPont .It’s created by polymerization of tetrafluroethylene molecules. The polymers are stable ,heat

resistant ,strong to many chemicals and has a nearly frictionless surface .Teflon is used in plumbing tape , cookware , tubing ,waterproof coatings ,films and bearings.

SECTION –B : EMPIRICAL REVIEW.

(i) Reviews Related To Plastic Hazards To Human Health

Garcia. E, Hurley .S, Nelson DO, Hertz A and Reynolds P., (2015) , studied the population of 1,12,378 California Teachers Study participants included 5,676 women diagnosed with invasive breast cancer. Increased risk for several compounds, including acrylamide, carbon tetrachloride, propylene oxide and vinyl chloride, but after adjustment for multiple comparisons, only results for propylene oxide and vinyl chloride remained statistically significant.

Josyula. S, Rothman. N, Lin .J, et al .,(2015) , stated that Household Air Pollution (HAP) from solid fuel combustion contributes to 2.6% of the global burden of disease. HAP emissions are an established lung carcinogen; however, associations with other cancer sites have not been fully explored. We conducted a meta-analysis of 18 case-control studies found that HAP was associated with cervical neo aplasia (OR = 6.46; 95% CI =3.12-13.36; 4 studies); oral (OR = 2.44; 95% CI = 1.87-3.19; 4 studies; 1000 cases/3450 controls); nasopharyngeal (OR = 1.80; 95% CI = 1.42-2.29; 6 studies; 2231 cases/2160 controls); pharyngeal (OR = 3.56; 95% CI = 2.22-5.70; 4 studies; 1036 cases/3746 controls); and laryngeal (OR = 2.35; 95% CI = 1.72- 3.21; 5 studies; 1416 cases/4514 controls) cancers. results suggest that the carcinogenic effect of HAP observed for lung cancer may extend to other cancers, including those of the cervix and the upper aero-digestive tract.

MR.Mangessh,V.Jabade, Mr.Ameym and Khande,(2015), conducted the sudy to assess the knoledge among the students in high school .the finding showed that the significant association between the knowledge and demographic variabl

Bittner. GD, Yang. CZ and Stoner MA, (2014), stated that many BPA-free PC- replacement products still leached chemicals having significant levels of EA, as did BPA-containing PC counterparts they were meant to repla. That is, BPA-free did not mean EA-free. However, this study also showed that some PC-replacement products did not leach chemicals having significant levels of EA , that may have potential adverse effects on our health or the health of future generations **.**

Bhandari R, Xiao J, and Shankar A, (2013), examined the association between urinary BPA and obesity in children aged 6-18 years from the National Health and Nutrition Examination Survey (2003-2008). The primary exposure was urinary BPA and the outcome was obesity, defined as the ≥ 95th percentile of body mass index specific for age and sex. We found a positive association between increasing levels of urinary BPA and obesity, independent of age, sex, race/ethnicity, education, physical activity, serum cotinine, and urinary creatinine.

Dennis Thompson, Health Day News (2013), stated that insulin resistance and urinary levels of phthalate in 766 kids aged 12-19 .about 3,300 kids aged 6-18 ,and found that children with high BPA levels tend to have excessive amounts of body fat and unusually expanded waistlines.

Frederiksen H, Nielsen JK, Mørck TA, et al ., (2013) , studied first morning urine samples were collected from 6 to 11 years Danish children and their mothers. Children were significantly higher exposed to bisphenol A and some of the phthalates than their mothers, whereas mothers were higher exposed to compounds related to cosmetics and personal care products such as parabens .

Jhonson .C, Harley. K.G, Gunier. R.B, et al.,(2013), stated that Prenatal urinary BPA concentrations were associated with increased internalizing problems in boys, including anxiety and depression, at age 7. Childhood urinary BPA concentrations were associated with increased externalizing behaviours, including conduct problems, in girls at age 7 and

increased internalizing behaviours and inattention and hyperactivity behaviours in boys and girls at age 7, showed associations of early life BPA exposure with behaviour problems, including anxiety, depression, and hyperactivity in children.

R.K. Srivastava and Sushila Gorara, (2013) ,stated that the bisphenol – A changes in the insulin resistance, reproduction system ,cardiovascular function and brain function .BPA behaves as an oestrogen receptor agonist and mimics the oestrogen hormone.

Soliman .A.S, Kim J.H, Rozek L.S, et al ., (2013) , tested the urinary concentrations of total (free plus conjugated) species of BPA in spot samples were quantified for 60 girl aged 10 to 13. CpG methylation varied widely among girls, and higher urinary BPA concentrations were generally associated with less genomic methylation.

Stephanie L,Wright A,Richard C., (2013),stated that the plastic debris are the micro plastic and potentially also the nano - scale , are widespread in the environment . Micro plastic have accumulated in oceans and sediments worldwide in recent years , with maximum concentration reaching 100,000 particles m^3 .

Vandenberg LN, Hunt PA, Myers JP et al., (2013),stated that human exposure to bisphenol A (BPA), a synthetic oestrogen found in numerous consumer products, is widespread. However, scientific knowledge about the sources and routes of exposure remains incomplete. Although human bio monitoring studies report small amounts of bioactive BPA in the blood of most subjects, toxic kinetic models suggest that circulating levels should be undetectable. The results concluded that consistent with the large number of hazards and adverse effects identified in laboratory animals exposed to low doses of BPA.

Losa-Ward S.M, Todd K.L, McCaffrey K.A ,et al ., (2012) , stated that hypothalamic neurons, which produce the kisspeptin family of peptide

hormones (Kp), are critical for initiating puberty and maintaining oestrous cyclist by stimulating gonadotropin-releasing hormone (GnRH) release. Conversely, RFamide-related peptide-3 (RFRP3) neurons inhibit GnRH activity. It has previously been shown that neonatal exposure to bisphenol A (BPA) can alter the timing of female pubertal onset and induce irregular oestrous cycles or premature anoestrus.

Nelson J.W, Scammell M.K, Hatch E.E et al., (2012) , examined the association between the urinary concentrations of BPA, serum concentrations of four polyfluoroalkyl chemicals, and multiple measures of socioeconomic position.BPA concentrations were higher in people who reported very low food security and received emergency food assistance than in those who did not. This association was particularly strong in children: 6-11 year-olds whose families received emergency food had BPA levels 54% higher (95% CI, 13 to 112%) than children of families who did not.

Taskeen A, Naeem I and Atif M ., (2012) ,stated that a total of 100 individuals were selected for study according to the following five age groups: 5-10, 11-20, 21-30, 31-40 and 41-50 years to assess the BPA contents in blood and to assess the risk of cancer. Results concluded that bisphenol A contents found in blood samples of all age groups ranged from 1.53-3.98 (mean = 2.94, SD = 0.9). P-values, for the exposed people and those having a history of cancer, were < 0.05 showing a significant relationship between BPA and cancer The United States Environmental Protection Agency (US EPA) has established a reference dose of 50 microgram/L. Odd ratios and relative risk for smoking habit were < 1 while for all others they were > 1.

Delilah Lithner, Åke Larsson and Goran Dave, (2011), stated that Plastics constitute a large material group with a global annual production that has doubled in 15 years (245 million tonnes in 2008). Plastics are present everywhere in society and the environment, especially the marine environment, where large amounts of plastic waste accumulate. He identified hazardous substances used in polymer production for which the risks should be evaluated

for decisions on the need for risk reduction measures, substitution, or even phase out.

Neeti Rustagi ,S.K. Pradhan and Ritesh Singh,(2011),states that plastics proves their injurious nature towards human health in many direct or indirect ways. Phthalates mainly used as plasticizers in Poly Vinyl Chloride (PVC). including extensive use in toys and other children's products . Phthalates with a variety of adverse outcomes, including increased adiposity and insulin resistance, decreased anogenital distance in male infants, decreased the sex hormone level and other consequences for the human reproductive system, both for females and males, Infants and children may be especially vulnerable to the toxic effects of phthalates given their increased dosage per unit body surface area, immature metabolic system capability and developing endocrine and reproductive system.

Cheryl Erler and Julie Novak ,(2010), stated that BPA is a chemical used extensively to manufacture commonly used plastics and epoxy resins liners for food and beverage can, has been shown to exert endocrine – disrupting effects and result in behaviour changes ,altered growth and early secondary sexual maturation.

Rolf U. Halden , (2010) , stated that plastics are indispensable materials in the modern society , and many products manufactured from the plastic are a boon to public health. However ,plastics also poses health risks .Of principal concerns are endocrine –disrupting properties , as triggered for examples by bisphenol –A and di-2- ethylhexylphthalate .

Bridget M Kuehn, (2009), stated that the melamine sickened and killed pets revealed that the chemical could be harmful under certain circumstances .Since then , more than 50,000 Chinese children have been admitted in the hospitals, and at least 6 died.

Jessica A.Knoblauch ,The Environmental Health News,(2009) ,stated that chemicals added to plastic are absorbed by human bodies .Some of these

compounds have been found to alter hormones or have other potential problems. Plastic debris ,laced with chemicals and often ingested by marine animals ,can injures or poison wildlife.

(ii) Reviews Related To Plastic Hazards To Environment

Alexannder G.J.Driedge ,Hans.A.Durr, Kristen Mitchell, et al ., (2015) , stated that plastic pollution by plastic debris in the Laurentian Great Lakes , it affects the open water shoreline ,typically more than 80% of anthropogenic litter along the shoreline of the Great Lakes is comprised of plastics. Sources of plastic debris where from the products used by the consumer, pellets from the plastic manufacturing industries.

Fauziah S.H, Liyana I.A, Agamuthu P,(2015), Studied marine debris have gained worldwide attention since many types of debris have found their way into the food chain of higher organisms. This study was conducted to quantify plastic debris buried in sand at selected beaches in Malaysia. A total of 2542 pieces (265.30 g m^{-2}) of small plastic debris were collected from all six beaches. This demonstrates that commitments and actions, such as practices of the 'reduce, reuse, recycle' (3R) approach, supporting public awareness programmes and beach clean-up activities, are essential in order to reduce and prevent plastic debris pollution.

Ramji K. Bhandari et al .,Journal of Scientific Reports (2015) , tested the aquatic vertebrates have the potential for ecological impacts . bisphenol –A and 17 alpha ethinylestradial are two ubiquitous estrogenic chemicals are presented in the area .Observation suggested that the exposure of these two chemicals led to significant reduction in the fertilization rate in offspring two generation later as well as reduction of embryo survival.

Hasanin Khachi , Helen Meynell and Anna Murphy , (2014), stated that the asthma it is estimated that more than 5.6 million people in the UK are currently diagnosed with asthma, of whom 1.1 million are children . The occupational exposure of plastic is one the cause for asthma.

Hoarau L, Ainley L, Jean C and Ciccione S, (2014) , stated marine debris, caused by anthropogenic pollution, is a major problem impacting marine wildlife worldwide. This study documents and quantifies the ingestion and defecation of debris by 74 loggerhead sea turtles, Caretta caretta , in the South-West Indian Ocean. Debris was found in 51.4% of gut or faecal samples of loggerheads by-catch from Reunion Island long liners. Anthropogenic debris was ubiquitous in our samples with plastics accounting for 96.2% of the total debris collected , results highlight the magnitude of this pollution of the marine environment.

Marcus Eriksen ,Laurent C.M. Lebreton, Henry S. Carson,et al ., (2014), estimated that at least 5.25 trillion plastic particles weighing 268,940 tons are currently floating at sea . In the Southern Hemisphere the Indian Ocean appears to have a greater particle count and weight than the South Atlantic and South Pacific oceans combined. The data showed the weight of plastic pollution globally was estimated to comprise 75.4% macro plastic, 11.4% meso plastic, and 10.6% and 2.6% in the two micro plastic size classes, respectively. Data suggest that a minimum of 233,400 tons of larger plastic items are afloat in the world's oceans compared to 35,540 tons of micro plastics.

Klein S, Worch E, Knepper T.P,(2010), Plastic debris is one of the most significant organic pollutants in the aquatic environment. Because of properties such as buoyancy and extreme durability, synthetic polymers are present in rivers, lakes, and oceans and accumulate in sediments all over the world. Analysis of the plastics by infrared spectroscopy showed a large abundance of polyethylene, polypropylene, and polystyrene, which covered more than 75% of all polymer types identified

PART –II CONCEPTUAL FRAMEWORK

KING'S GOAL ATTAINMENT THEORY

Conceptual framework is a basic structure that consists of certain abstract block which represents the observational the experimental and analytical / synthetically aspects of a process (or) system being conceived. The interconnection of these blocks completes the framework for certain expected outcomes. A conceptual framework is used in research to outline possible course of action (or) to present a preferred approach to an idea (or) thought. Nursing theory should provide the principles that underpin practice and help to generate further nursing knowledge.

The study is based on Imogene king's goal attainment theory (1997) which would be relevant for CAI regarding the hazards of use of plastic products. Imogene king's system is an open system. In this system human are in constant contact interaction with their environment.

Perception:

In this study the researcher perceives that most of the rural school children had inadequate knowledge and attitude regarding hazards of use of plastic products.

Judgment:

In this study the researcher judge that the CAI is effective in improving the knowledge and attitude regarding hazards of use of plastic products. It provides minimize the use of plastic products as well as prevent the plastic hazards.

Action:

In this study the researcher prepare the CAI is effective in improving the knowledge and attitude regarding hazards of use of plastic products.

Mutual goal setting:

In this study it is an activity that includes the children when appropriate in prioritizing the goal and in developing the plan of action to achieve those goals. Here this study both the researcher and children accept to undergone with the research study.

Reaction:

The researcher plans together and moves towards goal attainment. Here the researcher plan to teach the hazards of use of plastics after conducting the pre test to the experimental group.

Interaction:

The act of two or more persons in mutual presence and sequence of verbal and non-verbal behaviours that are directed towards goal. In this study the interaction includes pre test (for assessing the knowledge and attitude) than administration of CAI and post test to the samples of the experiment group and no intervention to the samples of the control group.

Transaction:

In this study the transaction includes post test on the assessment of knowledge and attitude regarding hazards of use of plastic products among the children. In this study the researcher and the subject came together for an interaction, a different set of perception to exchange. The researcher perceives the subject need to teaching the hazards of use of plastic products to minimize the plastic hazards among the rural school children. The researcher communicates the subjects by implementing the CAI regarding the hazards of use of plastic products between the subjects takes place. The goal is said to be achieved is an increased level of knowledge and attitude in experimental and control group.

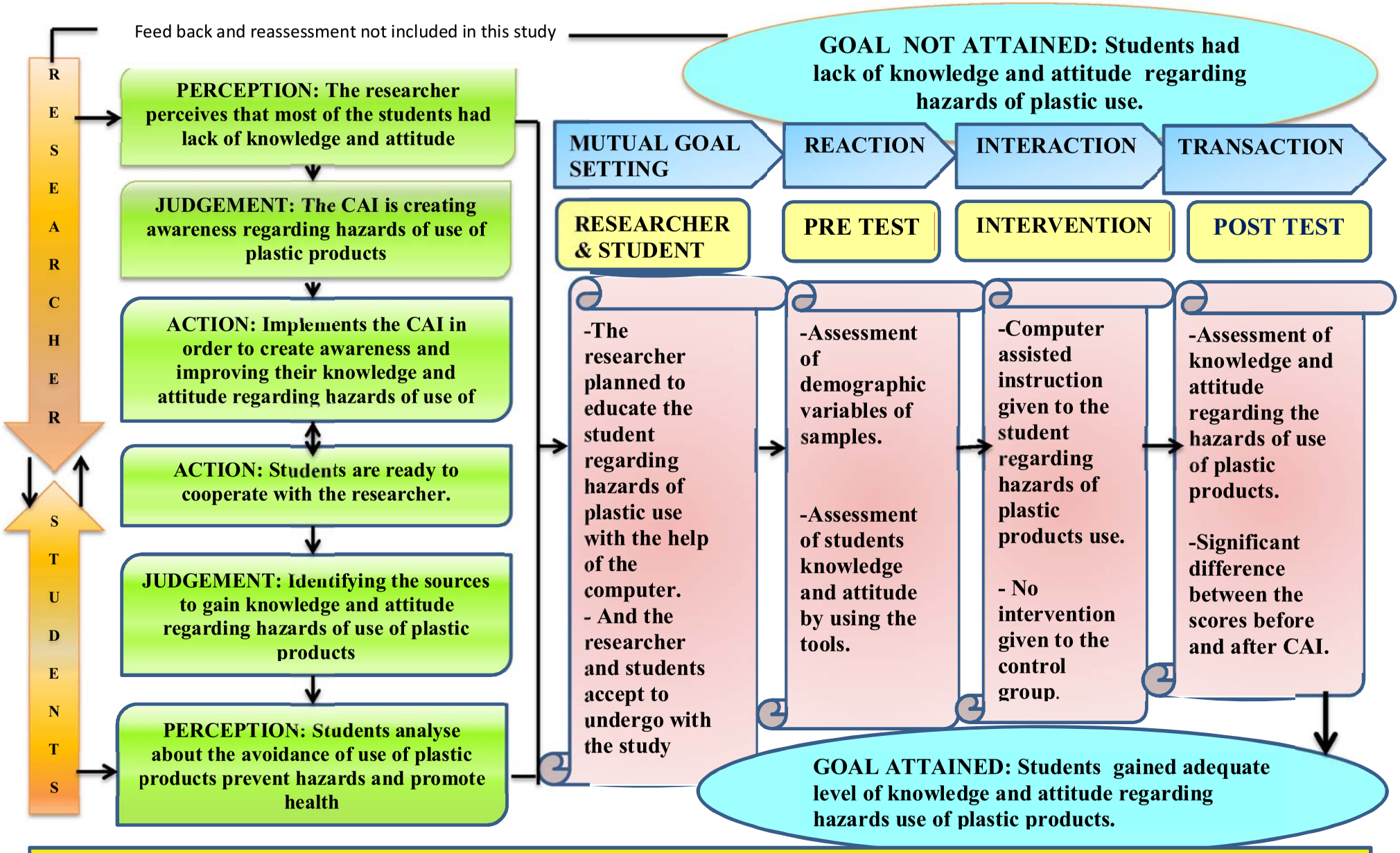
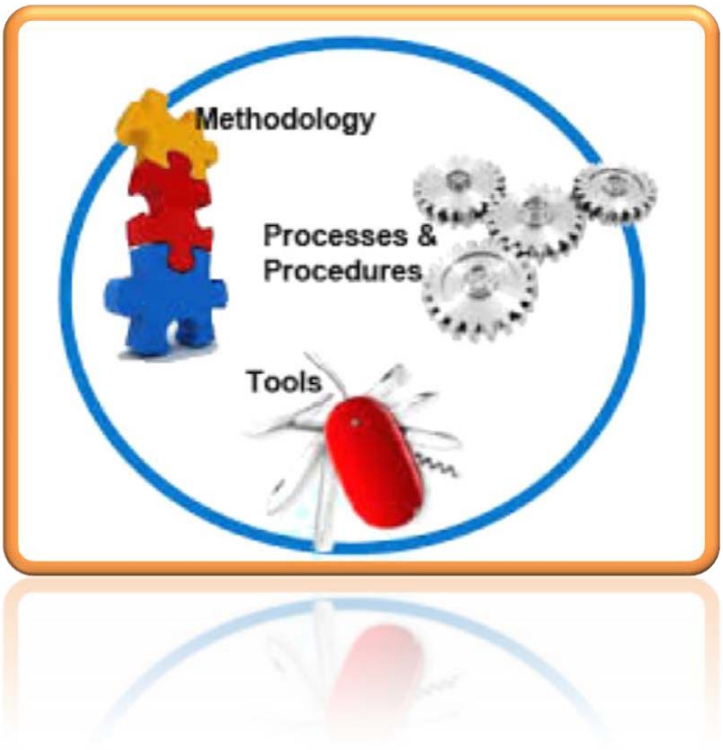


FIG-2.1 : Conceptual Frame work based on King's Goal Attainment Theory (1997) to evaluate the effectiveness of CAI regarding the hazards of use of plastic products among the rural school children.

CHAPTER - III



RESEARCH METHODOLOGY

CHAPTER-III

RESEARCH METHODOLOGY

Research methodology is a way to systematically solve the research problem. In this chapter the investigator discusses the Research approach, Research design, Variables, Setting, Population, Sample, Sample size, Sampling technique, Criteria for data collection, Description of the tool, Plan for data analysis and Protection of human rights.

RESEARCH APPROACH

Evaluative research approach was used in this study.

RESEARCH DESIGN

Quasi experimental design - Non equivalent pre test- post test control group design was used in this study.

E	**O_1**	**X**	**O_2**
C	**O_1**	**-**	**O_2**

E- experimental group. C –control group

O_1- pre test O_2 – post test

X- intervention(Computer Assisted Instruction regarding the hazards of use of plastic products)

VARIABLES

Independent variable: Computer Assisted Instruction regarding hazards of use of plastic products.

Dependent variables: Knowledge & attitude regarding hazards of use of plastic products.

Demographic variables: Age, Gender, Education of the father , Education of the mother, Monthly income of the family, Area of residence, Previous source of information.

SETTING

The study was conducted for experimental group at Government Higher Secondary School, Punnailnallur, Thanjavur,Dt, which was located 15kms away from the city, and for control group at Government Higher Secondary School,Aarchuthipattu ,Thanjavur ,Dt and Government Higher Secondary School,Urantharayankudikadu ,Thanjavur ,Dt which were located 30 kms away from the city.

POPULATION

The population of this study was the school children studying in Rural Schools, Thanjavur (dt).

SAMPLE

The sample of this study was the school children studying in eighth standard at Rural School ,Thanjavur(dt).

SAMPLE SIZE

The sample size comprised of 120 eighth standard school children who were studing in the selected rural schools ,Thanjavur ,Dt.

Experimental group : 60students

Control group : 60 students

SAMPLING TECHNIQUE

Non probability - convenient sampling technique was used in this study.

CRITERIA FOR SAMPLE SELECTION

INCLUSION CRITERIA

- The school children who were aged between 13&15 years.
- The school children who were studying in the rural schools .
- The rural school children who could understand, read and write Tamil & English.
- The rural school children who were available at that time of data collection.

EXCLUSION CRITERIA

- The school children who were not willing to participate in this study
- The school children who were sick at the time of study.

DATA COLLECTION TOOLS

Semi structured questionnaire will have III parts,

Part-I - Demographic variables.

Part-II- It consisted of self administered questionnaire used to assess the knowledge regarding hazards of use of plastic products.

Part-III- It consisted of 5 point Likert scale used to assess the attitude regarding hazards of use of plastic products.

REPORT OF THE PILOT STUDY

Pilot study was conducted to test the reliability, practicability, validity and feasibility of the tool. Pilot study was conducted for a period of 2 weeks. The investigator obtained a written consent from the authorities of Government High School, Puthur,(Experimental group) and Government High School, Kovilur (Control group). The investigator obtained the oral consent from the participants prior to the study. Non probability convenient sampling technique was used to select the samples. The pre test was conducted by using knowledge questionnaire to assess the knowledge and 5 point Likert scale to assess the attitude. The next day, CAI was provided to the (experiment group) and the post test was conducted after 7 days by using the same tools for both experimental and control groups. The result of the pilot study was analysed by the descriptive and inferential statistics and it showed the study was feasible to do. So the main study was proceeded.

RELIABILITY AND VALIDITY OF THE TOOL

The reliability and validity of the tool was established with Medical and Nursing experts. The tool was modified according to the suggestions and

recommendations of experts and the tool was finalized. The reliability of the tool was established by test-retest method ,experimental group r = 0.8 and control group r = 0.3 (Karl Pearson co-efficient Formula)

METHOD OF DATA COLLECTION

Written formal permission was obtained from the authorities of the schools. The investigator obtained the oral consent from the participants prior to the study. Non probability convenient sampling technique was used to select the samples. The investigator conducted the pre test by using the self administered knowledge questionnaire to assess the knowledge and 5 Point Likert scale to assess the attitude . The next day CAI was provided to the experimental group and the post test was conducted after 7 days by using same tools for both experimental &control groups to determine the knowledge and attitude of the subjects with the help of using the same questionnaire and 5 point Likert scale.

SCORING AND INTERPRETATION PROCEDURE

(A) SCORING OF THE TOOL

PART-I:

It consisted of 24 items related to knowledge regarding hazards of use of plastic products Each correct answers carries “1” mark and “0” mark for wrong answer.

$$\frac{\text{Obtained score}}{\text{Total score}} \times 100$$

TABLE 3.1 Represents the frequency & percentage for the levels of knowledge distribution.

LEVEL OF KNOWLEDGE	SCORE	PERCENTAGE
Inadequate knowledge	0 – 8	0 – 33 %
Moderately adequate knowledge	9 – 16	34 – 67%
Adequate knowledge	17 – 24	68 – 100%

PART-II

It consisted of 12 items related to attitude likert scale. Each item carries "1" (one) mark for correct answer "0" mark for wrong answer.

$$\frac{\text{Obtained score}}{\text{Total score}} \times 100$$

TABLE 3.2 Represents the percentage for the levels of practice score

LEVEL OF ATTITUDE	SCORE	PERCENTAGE
Inadequate attitude	0-20	0 - 33 %
Moderately attitude	21-40	34 – 67 %
Adequate attitude	41-60	68 – 100%

PLAN FOR DATA ANALYSIS

Collected data was tabulated and analysed by using descriptive and inferential statistical methods.

TABLE 3.3 Represents the plan for data analysis

S. NO	DATA ANALYSIS	METHODS	REMARKS
1.	Descriptive statistics	Percentage, Frequency distribution and Mean, standard Deviation	To describe the demographic variables of rural school children's knowledge and attitude in both experimental and control group.
		Correlation	To determine the relationship between the post test scores of knowledge and attitude of rural school children in both experimental and control group.
2.	Inferential statistics	Paired "t" Test	To assess the effectiveness of Computer Assisted Instruction regarding hazards of use of plastic products among the rural school children.
		Unpaired "t" test	To compare the knowledge and attitude of rural school children in both experimental and control group.
		Chi-square test	To find out the association between the knowledge and attitude of rural school children in both experimental and control groups with their selected demographic variables.

PROTECTION OF HUMAN SUBJECTS

The research proposal was approved by the dissertation committee prior to conduct the pilot study. The permission was obtained from the head of the institutional authorities. After the clear explanation about the study, oral consent was obtained from each participant before started the data collection. Assurance was provided to the subjects that the anonymity, confidentiality and subject privacy would be guarded.

CHAPTER -IV

DATA ANALYSIS

CHAPTER –IV

DATA ANALYSIS

This chapter deals with the description of sample characteristics , analysis and interpretation of data collected from the rural school children regarding hazards of use of plastic products.

This chapter represents the organization of data and interpretation of data by using the descriptive and inferential statistical methods .The data was collected and analysed as per the objectives of the study.

ORGANIZATION OF DATA

The data was organized and tabulated as follows.

SECTION : 1

Assessment of demographic variables of the rural school children regarding hazards of use of plastic products.

SECTION : 2

Assessment of pre test levels of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

SECTION : 3

Assessment of post test levels of attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

SECTION : 4

Comparison of pre test and post test levels of knowledge and attitude score regarding hazards of use of plastic products among the rural school

children in both experimental and control group.

SECTION : 5

Comparison of experimental and control group levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children.

SECTION : 6

Assessment of correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

SECTION : 7

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children with their age, gender, education of the father , education of the mother , monthly income of the family, previous source of information ,area of residence.

PRESENTATION OF DATA

SECTION : I

Assessment of demographic variables of the rural school children regarding hazards of use of plastic products.

TABLE: 4.1 Represents the frequency and percentage distribution of demographic variables of rural school children regarding hazards of use of plastic products in both experimental and control groups.

N=60(E)+60(C) =120

DEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	Percentage	Frequency	Percentage
Age in years				
a) 13 years	32	53.3%	33	55%
b) 14 years	25	41.6%	24	40%
c) 15 years	3	5.0%	3	5%
Gender				
a) Male	33	55%	33	55%
b) Female	27	45%	27	45%
Education Of The Father				
a) Illiterate	27	45%	31	51.6%
b) Primary	22	36.6%	22	36.6%
c) High school	11	18.3%	8	13.3%
d) Higher secondary	0	0%	0	0%
e) Diploma	0	0%	0	0%
f) Degree	0	0%	0	0%

Education Of The Mother				
a) Illiterate	34	56.6%	31	51.6%
b) Primary	25	41.6%	28	41.6%
c) High school	1	1.6%	1	1.6%
d) Higher secondary	0	0%	0	0%
e) Diploma	0	0%	0	0%
f) Degree.	0	0%	0	0%
Monthly Income Of The Family				
a) < Rs 5,000	30	50%	31	51.6%
b) Rs 5,001-10,000	30	50%	29	48.6%
c) > Rs10,001.	0	0%	0	0%
Area Of Residence				
a) Rural	39	65%	35	58.3%
b) Urban	0	0%	0	0%
c) Semi urban	21	35%	25	41.6%
Previous Source Of Information				
a) Health personnel	0	0%	0	0%
b) Friends	13	21.6%	15	25%
c) Relatives	0	0%	0	0%
d) Media	24	40%	23	38.6%
e) None of the above	23	38.3%	22	36.6%

TABLE : 4.1 represents the frequency and percentage distribution of demographic variables of rural school children regarding hazards of use of plastic products in both experimental and control groups.

From this table, it is implied that among the 60(100%) rural school children in the experimental group , 32(53.6%) students were 13 years old, 25 (41.6%) students were 14 years old and 3(5%) students were 15 years old in experimental group .Were as in the control group maximum of students 33(55%) were 13 years old, 24(40%) students were 14 years old and 3(5%) students were 15 years old in the control group.

Regarding the gender of the rural school children ,33(55%) of them were males,27(45%)of them were females in the experimental group .Where as in the control group 33(55%) of them were males,27(45%)of them were females.

Regarding the rural school children's education of the father 27(45%) were illiterate ,22(36.6%) were studied primary education ,11(18.3%) of them were passed high school education in the experimental group .Where as in the control group 31(51.6%) were illiterate , 22(36.6%) were studied primary education , 8(13.3%) of them were passed high school education.

Regarding the rural school children's education of the mother 34(56.6%) were illiterate ,25(41.6%) were studied primary education ,1(1.6%) of them were passed high school education in the experimental group .Where as in the control group 31(51.6%) were illiterate , 28(46.6%) were studied primary education and 1(1.6%) of them were passed their high school education.

Regarding the monthly income of the family 30(50%) of them were gained grossly about < Rs.5,000 and 30(50%) of them were gained grossly about Rs.5,001-10,000 in the experimental group . Where as in the control group 31(51.6%) of them were gained grossly about < Rs.5,000 and 29(48.6%) of them were gained grossly about Rs.5,001-10,000.

Regarding the area of residence, the rural school children, maximum of children 39(65%) were coming from rural area and 21(35%) of them were coming from the semi urban area in the experimental group .Where as in the

control group maximum of children 35(58.3%) were coming from rural area and 25 (41.6%) of them were coming from the semi urban area.

Regarding the previous source of information 13(21.6%) were gained knowledge from friends,24(40%) of them were gained from media and 23 (38.6%) of them were not getting any information in the experimental group .Where as in the control group 15(35%) were gained knowledge from friends , 23(38.6%) of them were gained from media and 22(36.6%) of them were not getting any information regarding the hazards of use of plastic products.

Figure 4.1 Represents the percentage distribution of age of the rural school children in experimental and control groups**.**

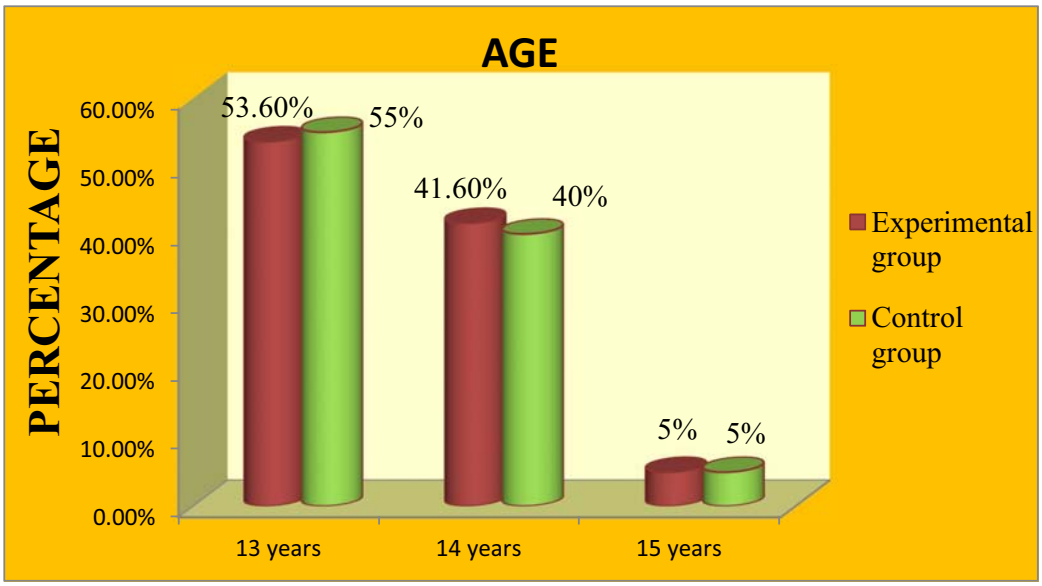


Figure 4.2 Represents the percentage distribution of gender of the rural school children in experimental and control groups.

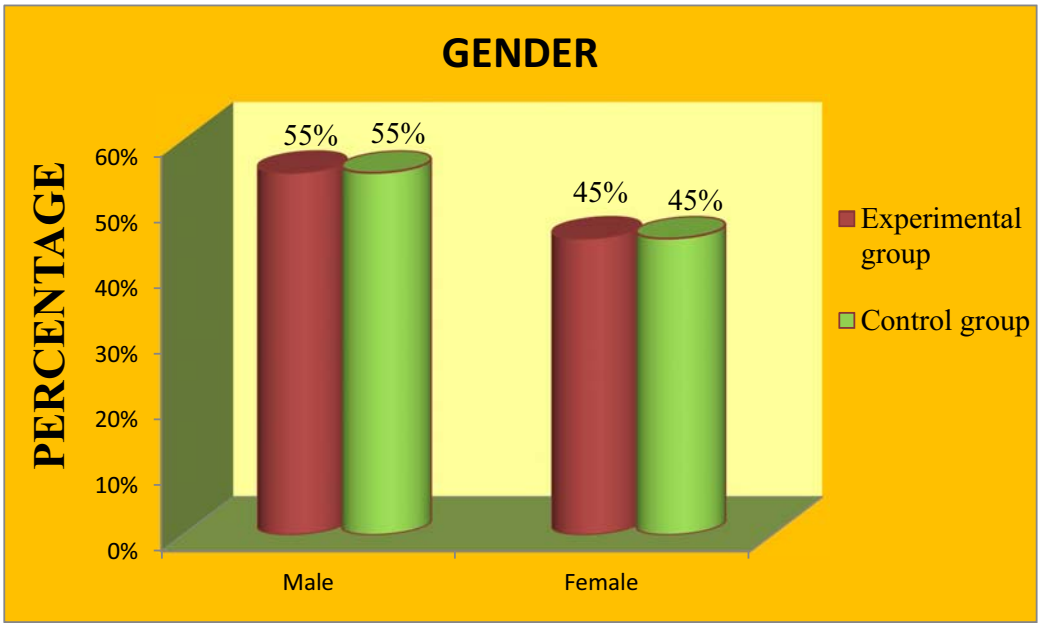


Figure 4.3 Represents the percentage distribution of education of the father of the rural school children in experimental and control groups.

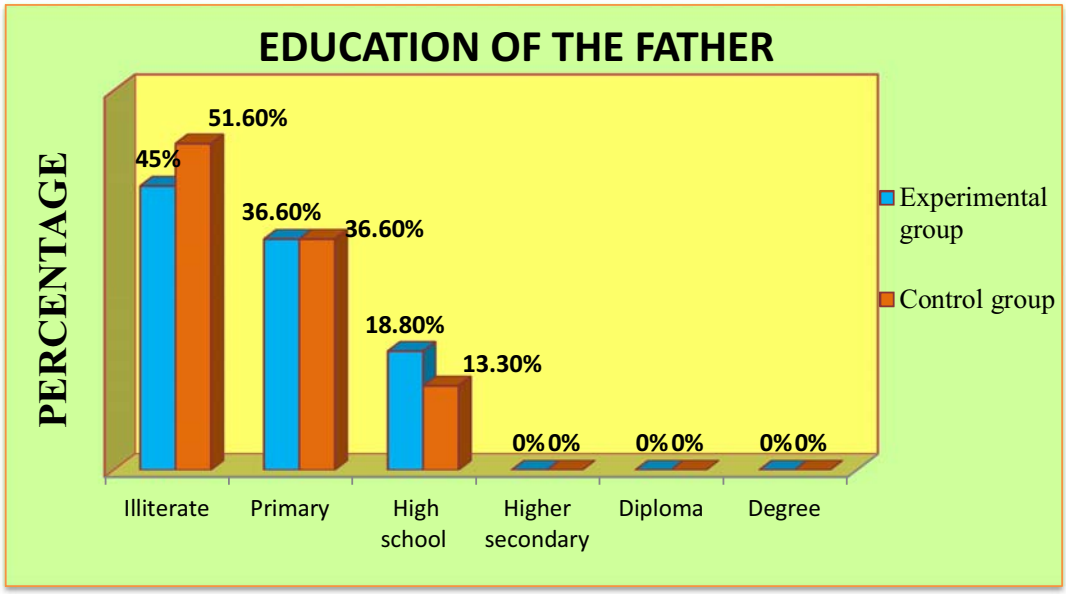


Figure 4.4 Represents the percentage distribution of education of the mother of the rural school children in experimental and control groups.

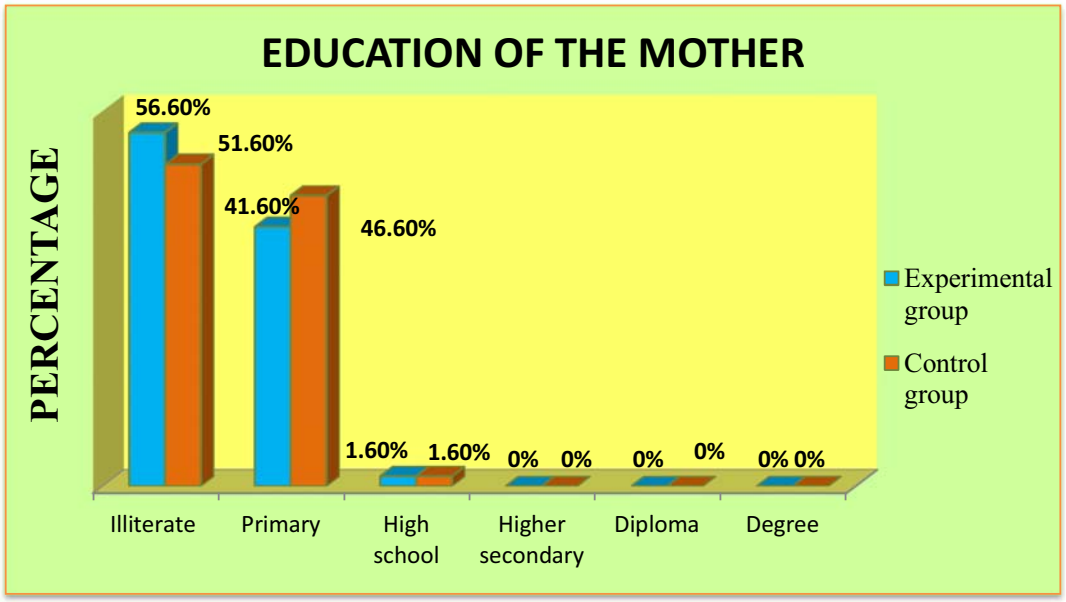


Figure 4.5 Represents the percentage distribution of monthly income of the family of the rural school children in experimental and control groups.

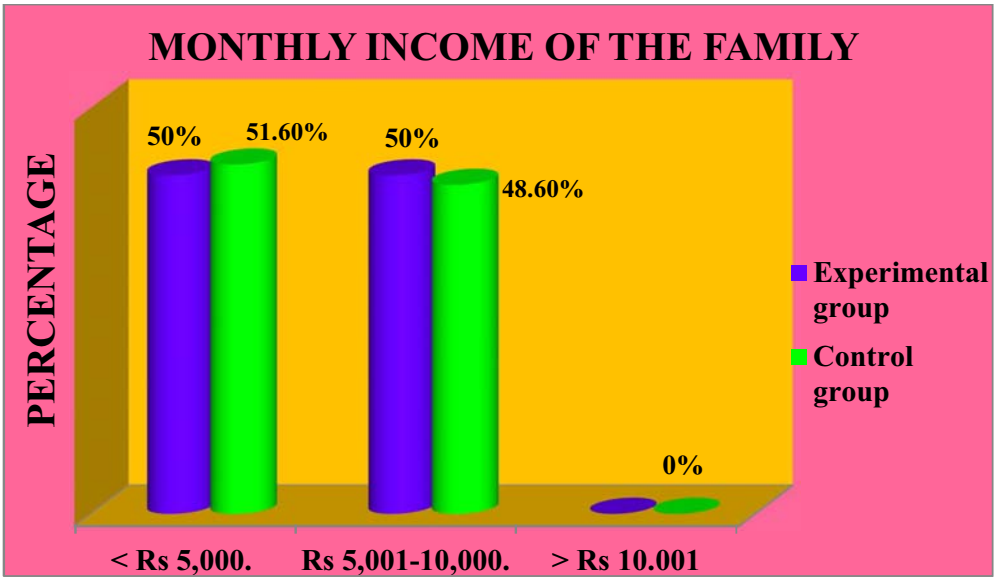


Figure 4.6 Represents the percentage distribution of area of residence the of rural school children in experimental and control group.

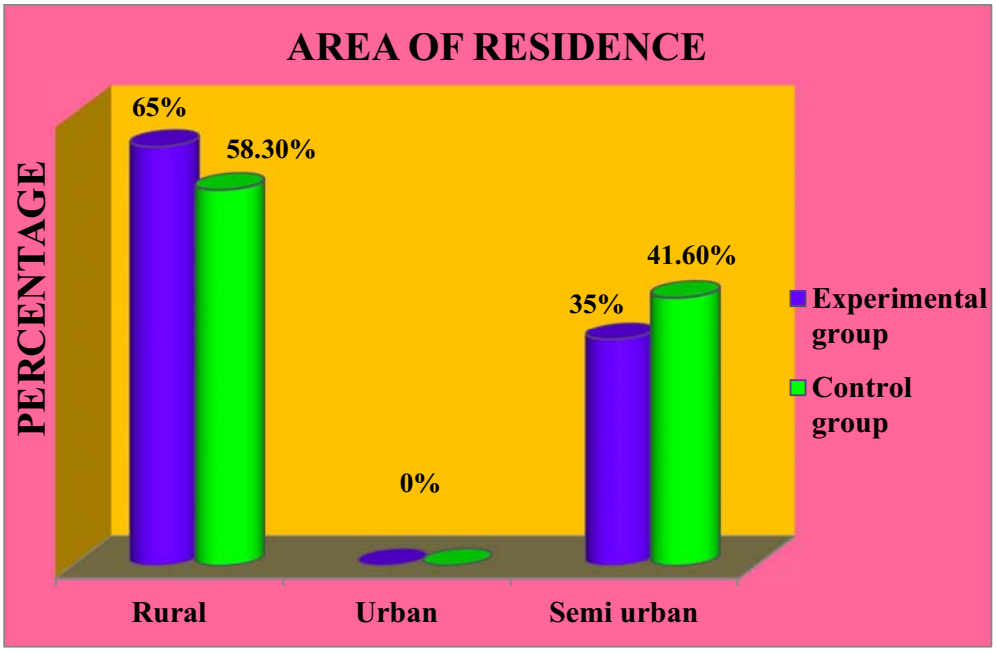
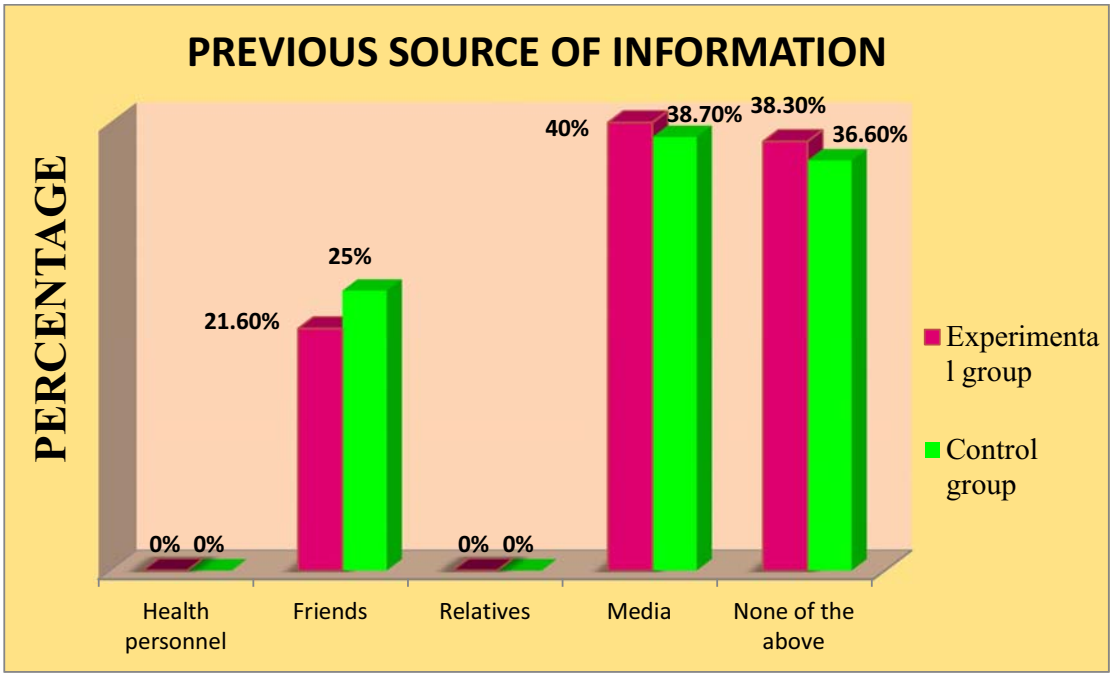


Figure 4.7 - Represents the percentage distribution of previous source of information of the of rural school children in experimental and control groups.



SECTION : 2

Assessment of pre test levels of knowledge and attitude regarding regarding hazards of use of plastic products among the rural school children.

TABLE : 4.2

Represents frequency and percentage distribution of pre test levels of knowledge regarding hazards of use of plastic products among the rural school children.

N=60(E)+60(C)=120

LEVELS OF KNOWLEDGE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	Percentage	Frequency	Percentage
Inadequate knowledge	41	68.33%	43	71.66%
Moderately adequate knowledge	19	31.66%	17	28.66%
Adequate knowledge	-	-	-	-

Table 4.2 Represents the Frequency and percentage distribution of pre test levels of knowledge regarding hazards of use of plastic products among the rural school children.

Assessment of pre test level of knowledge regarding the hazards of use of plastic revealed that 41(68.66%) of the student had inadequate knowledge and 19(31.66%) of the students had moderately adequate knowledge in experimental group. Where as in the control group 43(71.66%) of the student had inadequate knowledge and 17(28.66%) of the students had moderately adequate knowledge and none of them had adequate knowledge in both the experimental and control group.

TABLE : 4.3

Represents frequency and percentage distribution of pre test levels of attitude regarding hazards of use of plastic products among the rural school children.

N = 60 (E)+ 60(C) =120

LEVELS OF ATTITUDE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate attitude	44	73.33%	45	75%
Moderately adequate attitude	16	26.66%	15	25%
Adequate attitude	-	-	-	-

Table 4.3 Represents the Frequency and percentage distribution of pre test levels of attitude regarding hazards of use of plastic products among the rural school children.

Assessment of pre test level of attitude regarding the hazards of use of plastic products revealed that 44(73.33%) of the student had inadequate attitude and 16(26.66%) of the students had moderately adequate attitude in experimental group. Where as in the control group 45(75%) of the student had inadequate attitude and 15(25%) of the students had moderately adequate attitude and none of them had adequate attitude in both the experimental and control group.

SECTION : 3

Assessment of post test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children.

TABLE : 4.4

Represents the frequency and percentage distribution of post test levels of knowledge regarding hazards of use of plastic products among the rural school children.

N = 60 (E)+ 60(C) =120

LEVELS OF KNOWLEDGE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate knowledge	-	-	41	68.33%
Moderately adequate knowledge	18	30%	19	31.66%
Adequate knowledge	42	70%	-	-

Table 4.4 Represents the Frequency and percentage distribution of post test levels of knowledge regarding hazards of use of plastic products among the rural school children.

Assessment of post test level of knowledge regarding the hazards of use of plastic revealed that none of them had inadequate knowledge, 18(30%) of the students had moderately adequate knowledge and 42(70%) of the students had adequate knowledge in experimental group. Where as in the control group 41(68.33%) of the student had inadequate knowledge and 19 (31.66%) of the students had moderately adequate knowledge and none of them had adequate knowledge in the control group.

TABLE : 4.5

Represents frequency and percentage distribution of post test levels of attitude regarding hazards of use of plastic products among the rural school children.

N = 60 (E)+ 60(C) =120

LEVELS OF ATTITUDE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate attitude	-	-	43	71.66%
Moderately adequate attitude	21	35%	17	28.33%
Adequate attitude	39	65%	-	-

Table 4.5 Represents the Frequency and percentage distribution of post test levels of attitude regarding hazards of use of plastic products among the rural school children.

Assessment of post test level of attitude regarding the hazards of use of plastic products revealed that none of them had inadequate attitude, 21(35%) of the students had moderately adequate attitude and 39(65%) of the students had adequate knowledge in experimental group. Where as in the control group 43(71.66%) of the student had inadequate attitude and 17 (28.33%) of the students had moderately adequate attitude and none of them had adequate attitude in control group.

SECTION : 4

Comparison of pre and post test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

TABLE 4.6

Comparison of pre and post test levels of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

N = 60 (E)+ 60(C) =120

GROUP	PRE TEST		POST TEST		Paired "t" test value
	MEAN	SD	MEAN	SD	
Experimental group	8.58	2.88	19.06	3.39	t = 24.11*
Control group	9.18	3.44	8.50	2.77	t = 1.83

*significant

H0- There is no significant association between the pre test and post test levels of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

TABLE 4.6

Comparison of pre test and post test revealed that mean value 8.58 with standard deviation 2.88 of pre test has significant to the post test mean value 19.06 with standard deviation 3.39 and the 't' value CV = 24.11and TV = 2.0010 (CV > TV) which is significant at 0.05 level of experimental group.

Where as in the control group the analysis that mean value 9.18 with standard deviation 3.44 of pre test has significant to the post test mean value 8.50 with standard deviation 2.77 and the 't' value CV =

1.83 and TV = 2.0010 (CV > TV) which is not significant at 0.05 level for control group. It shows the given computer assisted instruction was very effective.

FIUGRE 4.8 Comparison of the pre test and post test knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

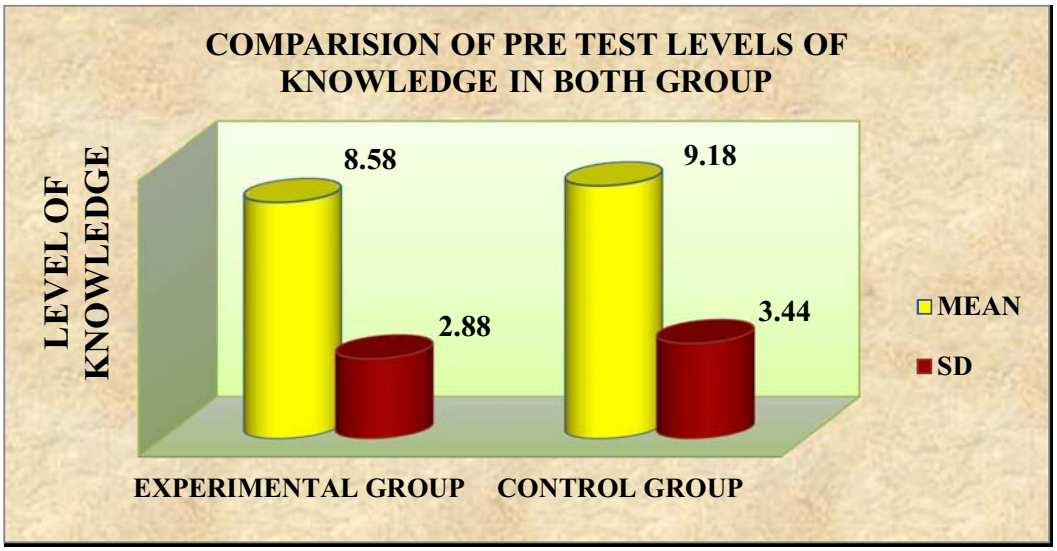


FIGURE 4.9 Comparison of the post test level of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

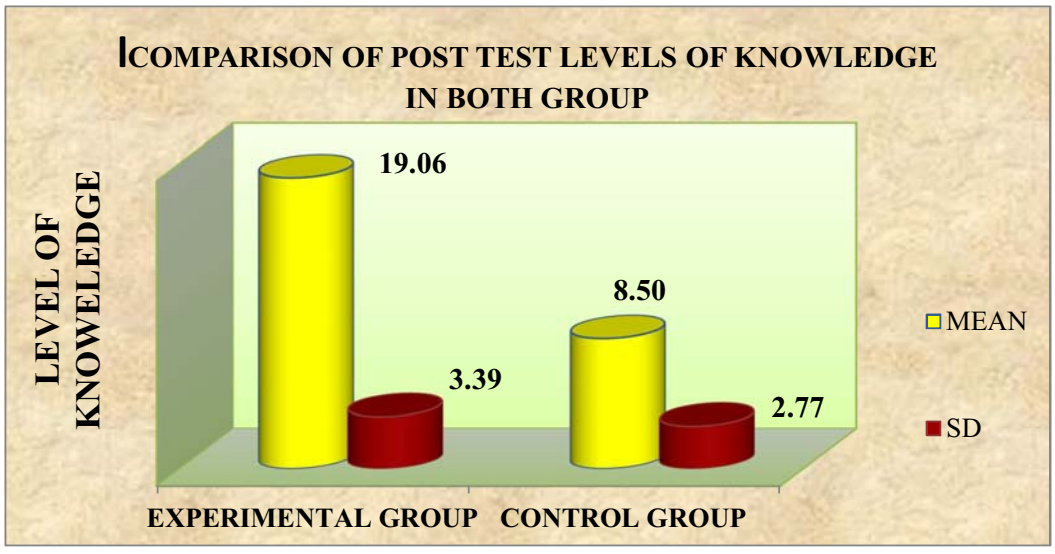


TABLE 4.7

Comparison of pre and post test levels of attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

N=60(E)+60(C)=120

GROUP	PRE TEST		POST TEST		Paired "t" test value
	MEAN	SD	MEAN	SD	
Experimental group	19.78	7.07	42.76	13.45	t = 16.00*
Control group	18.61	3.93	19.3	8.30	t = 1.1

* significant

H0 - There is no significant association between the pre test and post test levels of attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

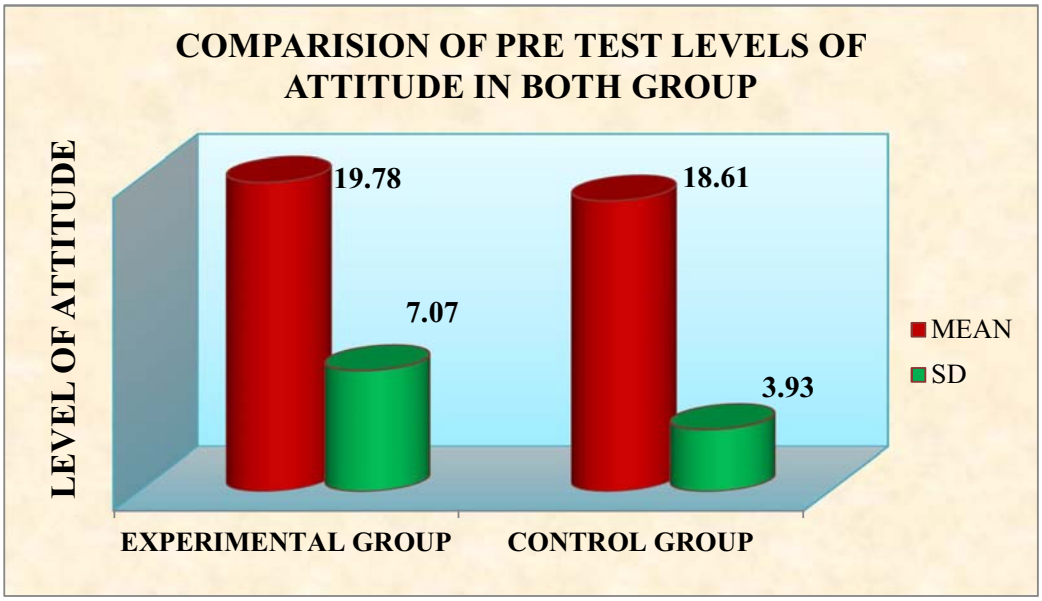
TABLE 4.7

Comparison of pre test and post test levels of attitude reveals that mean value 19.78 with standard deviation 7.07 of pre test has significant to the post test mean value 42.76 with standard deviation 13.45and the 't' value CV = 16.00 and TV = 2.0010 (CV > TV) which is significant at 0.05 level for experimental group.

Where as in the control group the analysis that mean value 18.61 with standard deviation 3.93 of pre test has significant to the post test mean value 19.3 with standard deviation 8.30 and the 't' value CV = 1.12 and TV = 2.0010 (CV > TV) which is not significant at 0.05 level for control group.

It shows the given computer assisted instruction was very effective.

FIUGRE 4.10 Comparison of pre test attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group



FIUGRE 4.11 Comparison of post test attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

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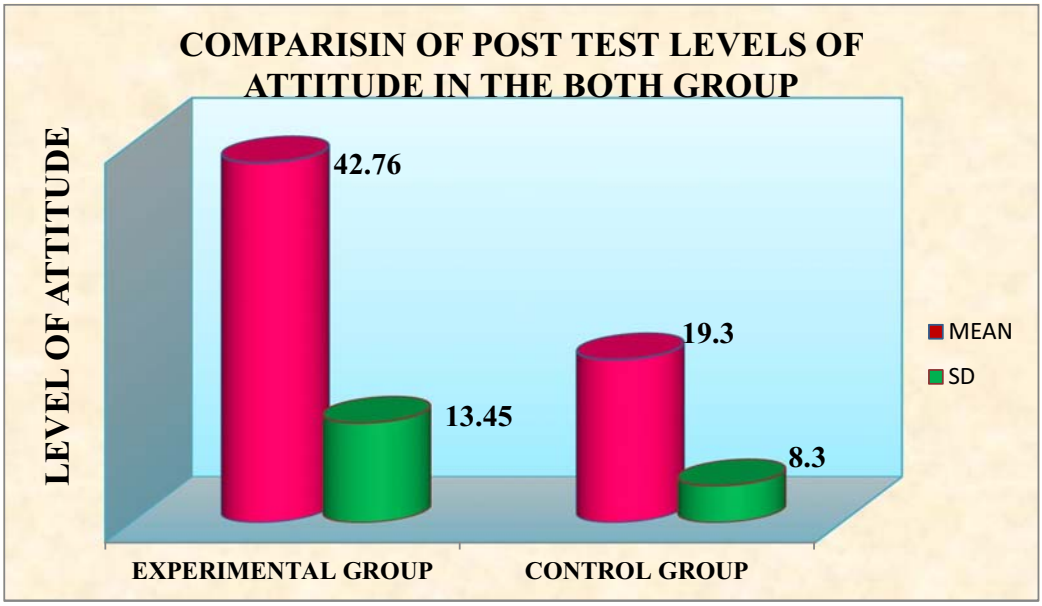


SECTION : 5

Comparison of experimental and control group levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children .

TABLE 4.8 Comparison of experimental and control group levels of knowledge regarding hazards of use of plastic products among the rural school children .

N=60(E)+60(C)=120

TEST	EXPERIMENTAL GROUP		CONTROL GROUP		Unpaired "t" test value
	MEAN	SD	MEAN	SD	
PRE TEST	8.58	2.88	9.18	3.44	t = 1.03
POST TEST	19.06	3.39	8.50	2.77	t = 20.37*

* significant

H_0 - There is no significant difference in the pre test and post test levels of knowledge between the experimental and control group.

TABLE 4.8 Comparison of pre test and post test levels of knowledge between the experimental and control group.

The analysis revealed that pre test mean value 8.58 with standard deviation 2.88 in the experimental group and the mean value 9.18 with standard deviation 3.44 in the control group and the 't' value CV = 1.03 and TV = 2.0010 (CV > TV) which is not significant at 0.05 level .For the post test mean value 19.06 with 3.39 standard deviation in experimental group ,where as in the control group the mean value 8.50 with standard deviation 2.77 and the 't' value CV = 20.37 and TV = 2.0010 (CV > TV) which is significant at 0.05 level. So the given CAI was effective.

FIGURE 4.12 Comparison of experimental and control group pre test level of knowledge regarding the hazards of use of plastic products among the rural school children.

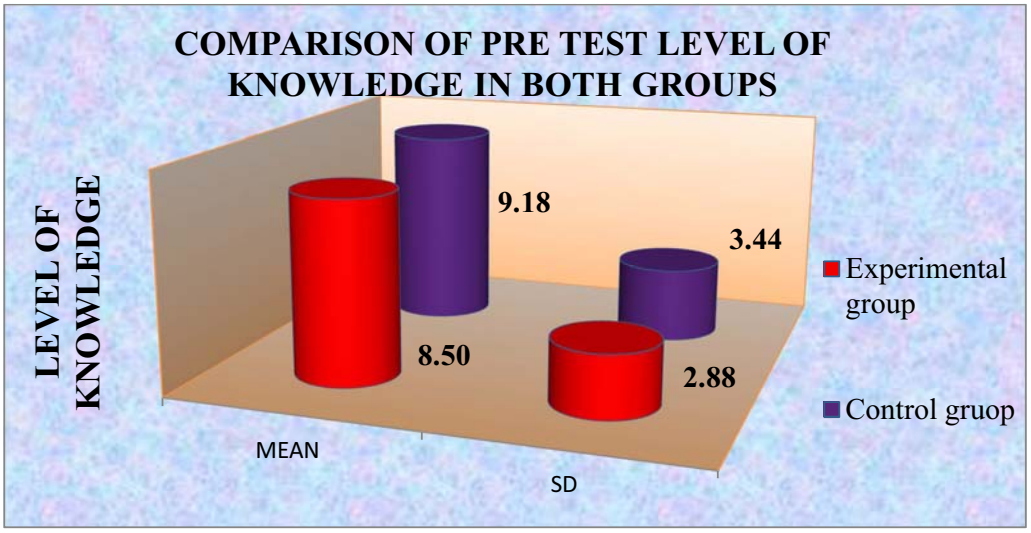


FIGURE 4.13 Comparison of experimental and control group post test level of knowledge regarding the hazards of use of plastic products among the rural school children.

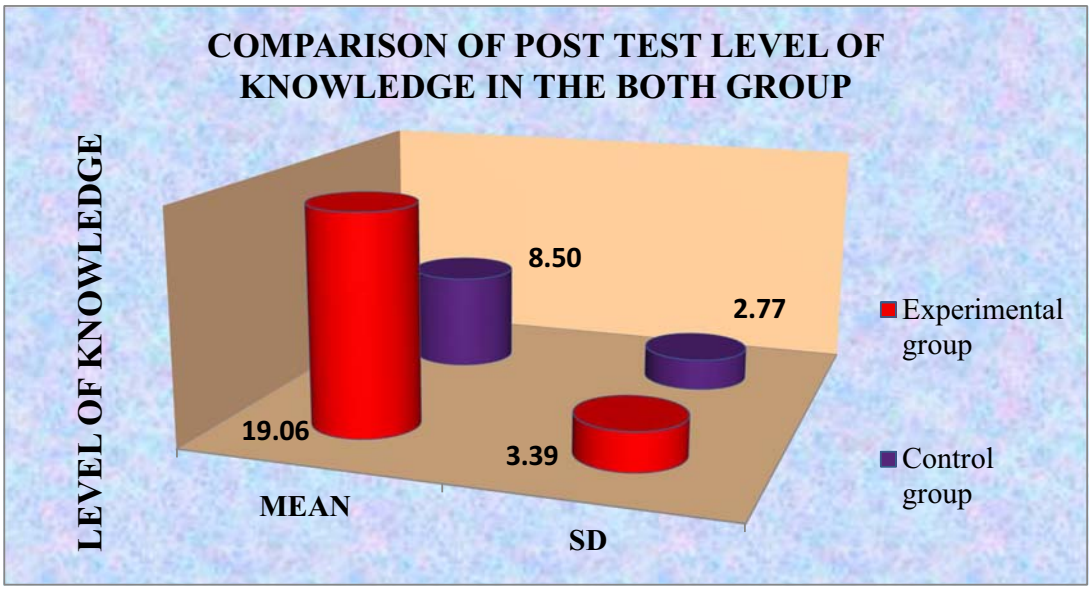


TABLE 4.9 Comparison of experimental and control group levels of attitude regarding hazards of use of plastic products among the rural school children .

N=60(E)+60(C)= 120

TEST	EXPERIMENTAL GROUP		CONTROL GROUP		Unpaired "t" test value
	MEAN	SD	MEAN	SD	
PRE TEST	19.78	7.07	18.61	3.93	t = 1.58
POST TEST	42.76	13.45	19.30	8.30	t=17.79*

* significant

H_0 - There is no significant difference in the pre test and post test levels of attitude between the experimental and control group.

TABLE 4.9 Represents the comparison of pre test and post test levels of attitude between the experimental and control group.

The analysis revealed that the pre test mean value 19.78 with standard deviation 7.07 in the experimental group and the mean value 18.61 with the standard deviation 3.93 in the control group and the 't' value CV = 0.59 and TV = 1.56(CV < TV) which is not significant at 0.05 level . For the post test mean value 42.76 with 13.45 standard deviation in experimental group ,where as in the control group the mean value 19.30 with standard deviation 8.30 and the 't' value CV = 17.79 and TV = 2.0010 (CV > TV) which is significant at 0.05 level.

The statistical analysis revealed that there is a highly significant difference in the post test levels of attitude of experimental as compared with the control group. So the given computer assisted instruction was effective .

FIGURE 4.14 Comparison of experimental and control group pre test level of attitude regarding the hazards of use of plastic products among the rural school children.

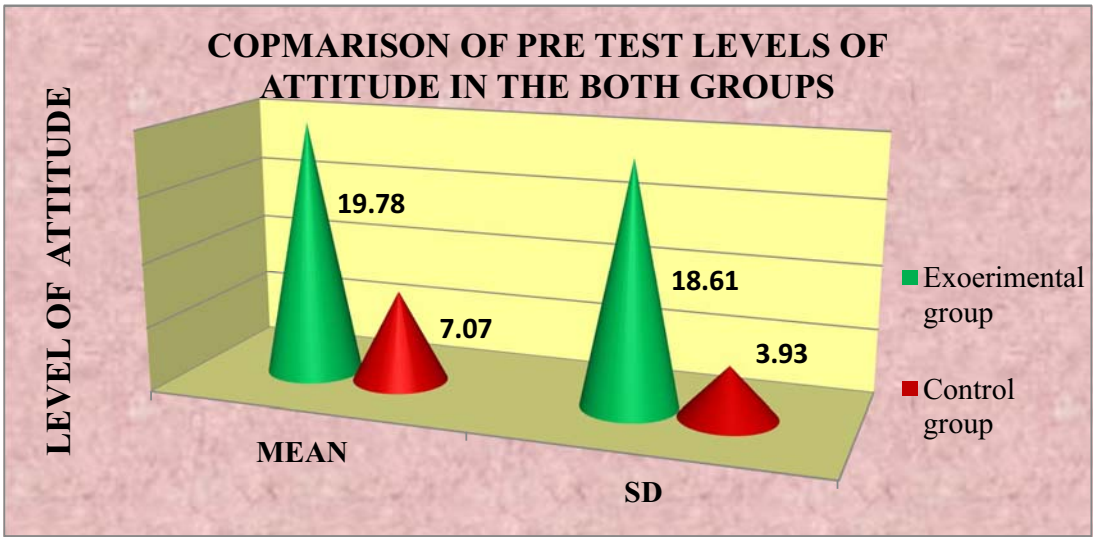
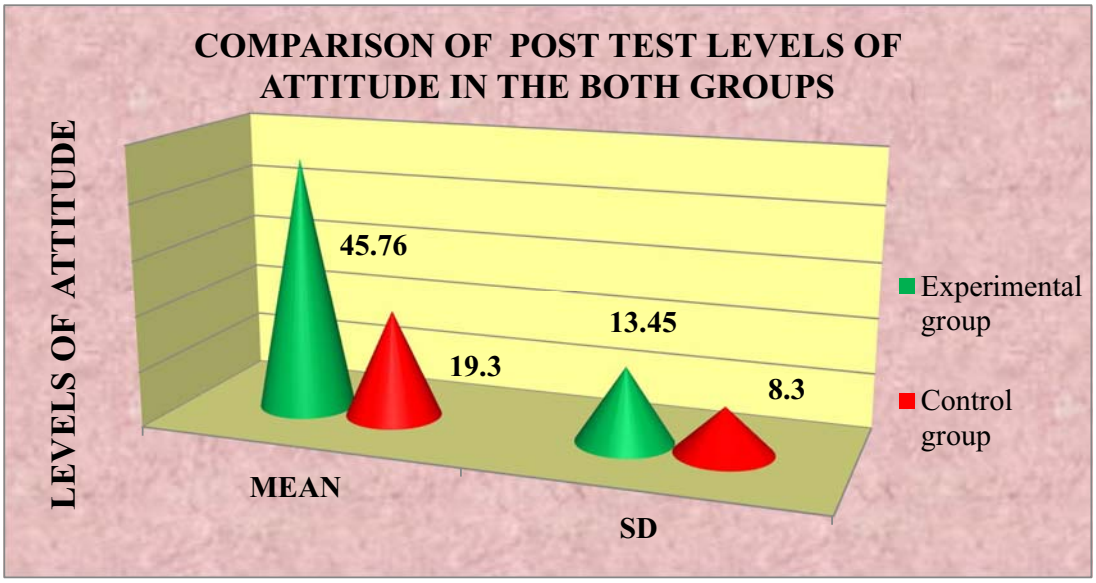


FIGURE 4.15 Comparison of experimental and control group post test level of attitude regarding the hazards of use of plastic products among the rural school children.



SECTION – 6

Assessment of correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

TABLE 4.10 Assessment of correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

N = 60(E) +60(C) =120

GROUP	POST TEST		POST TEST		" r" value
	MEAN	SD	MEAN	SD	
Experimental group	19.06	3.39	42.76	13.45	**r = 0.84** positive and highly significant.
Control group	8.50	2.77	19.3	8.30	**r = 0.31** positive and moderate significant

TABLE 4.10 Represents the correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

In experimental group the mean value knowledge represents 19.06with standard deviation 3.39 and the mean value of expressed practice 42.76with standard deviation 13.45and the correlation r = 0.84 which is positive and highly significance for post test scores. Where as in control group the mean value of knowledge 8.50 with standard deviation 2.77and the mean value of attitude 19.3with standard deviation 8.30and the correlation r = 0.31 which is positive and moderate significance for post test scores of knowledge and attitude .Hence there is a positive and highly significant correlation between the knowledge and expressed practice of experiment group. It reveals the given CAI was effective.

SECTION : 7

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in both experimental and control group with their selected demographic variables.

TABLE 4.11

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in experimental group with their selected demographic variables.

N= 60

Demographic Variables	Level of knowledge						χ^2	Level of attitude						χ^2
	Inadequate		Moderately Adequate		Adequate			Inadequate		Moderately Adequate		Adequate		
	NO	%	NO	%	NO	%		NO	%	NO	%	NO	%	
Age														
a)13 years	26	43.3	6	10	-	-	9.74*	28	46.6	4	6.6	-	-	12.6*
b)14 years	15	25	10	16.6	-	-		16	26.6	9	15	-	-	
c)15 years	0	0	3	5	-	-		0	0	3	5	-	-	
Gender														
a)Male	29	48.3	4	6.6	-	-	12.9*	27	45	6	10	-	-	2.6
b)Female	12	20	15	25	-	-		17	28.3	10	6.6	-	-	
Education of the father														
a) Illiterate	22	36.6	5	8.3	-	-		23	38.3	4	6.6	-	-	
b) Primary	13	21.6	9	15	-	-		14	23.3	8	13.3	-	-	
c) High school	6	10	5	8.3			3.9	7	11.6	4	6.6	-	-	3.6
d) Higher secondary	-	-	-	-	-	-		0	0	0	0	-	-	
e) Diploma	-	-	-	-	-	-		0	0	0	0	-	-	
f) Degree	-	-	-	-	-	-		0	0	0	0	-	-	

Education of the mother														
a) Illiterate	25	43.3	9	15	-	-		27	45	7	11.6	-	-	
b) Primary	16	26.6	9	15	-	-	2.7	17	28.3	8	13.3	-	-	3.7
c)High school	-	-	1	1.6	-	-		0	0	1	1.6	-	-	
d)Higher secondary	-	-	0	0	-	-		0	0	0	0	-	-	
e)Diploma	-	-	0	0	-	-		0	0	0	0	-	-	
f)Degree	-	-	0	0	-	-		0	0	0	0	-	-	
Income of the family.														
a)<Rs 5,000	28	46.6	2	3.3	-	-		28	46.6	2	3.3	-	-	
b)Rs 5,001-Rs10,000	13	28.3	17	28.3	-	-	16.5*	16	26.6	14	23.3	-	-	12.2*
c)>Rs 10,001	0	0	0	0	-	-		0	0	0	0	-	-	
Area of residence														
a) Rural	33	55	6	10	-	-		33	55	6	10	-	-	7.2
b) Urban	0	0	0	0	-	-	13.6*	0	0	0	0	-	-	
c) Semi urban	8	13.3	13	21.6	-	-		11	18.3	10	16.6	-	-	
Previous of information														
a) Health personnel	0	0	0	0	-	-		0	0	0	0	-	-	
b) Friends	10	16.6	3	5	-	-	9.7	11	18.3	2	3.3	-	-	15.9*
c) Relatives	0	0	0	0	-	-		0	0	0	0	-	-	
d) Mass media	11	18.3	13	21.6	-	-		11	18.3	13	28.3	-	-	
e) None of the above	20	33.3	3	5	-	-		22	36.6	1	1.6	-	-	

*significant

H_0 - there is no significant association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in experimental group with their selected demographic variables.

TABLE 4.11 Shows the association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in experimental group with their selected demographic variables.

The analysis revealed that there is a significant association between the children's Age, Gender ,Income of the family and Area of residence of pre test level of knowledge and there was no significant association between the Education of the father and as well as the mother and Previous source of information .Where as in pre test levels of attitude revealed that there was a significant association with the children's Age, Income of the family, and Previous source of information and there is no significant association of Gender, Area of residence and Education of the father and as well as the mother in the experimental group at the significance of 0.05 level.

TABLE 4.12

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in control group with their selected demographic variables.

N= 60

Demographic Variables	Level of knowledge						χ^2	Level of attitude						χ^2
	Inadequate		Moderately Adequate		Adequate			Inadequate		Moderately adequate		Adequate		
	NO	%	NO	%	NO	%		NO	%	NO	%	NO	%	
Age														
a)13 years	28	46.6	5	8.3	-	-	11.4*	28	46.6	5	8.3	-	-	3.81
b)14 years	15	25	9	15	-	-		15	25	9	15	-	-	
c)15 years	0	0	3	5	-	-		2	3.3	1	1.6	-	-	
Gender														
a)Male	30	50	3	5	-	-	20.7*	30	50	3	5	-	-	9.88*
b)Female	13	21.6	14	23.3	-	-		15	25	12	20	-	-	
Education of the father														
a) Illiterate	24	40	7	11.6	-	-		26	43.3	5	8.3	-	-	
b) Primary	13	21.6	9	15	-	-		13	21.6	9	15	-	-	
c)High school	6	10	2	3.3	-	-	2.2	6	10	2	3.3	-	-	4.27
d)Higher secondary	0	0	0	0	-	-		0	0	0	0	-	-	
e) Diploma	0	0	0	0	-	-		0	0	0	0	-	-	
f) Degree	0	0	0	0	-	-		0	0	0	0	-	-	
Education of the mother														
a) Illiterate	24	40	7	11.6	-	-	6.26	25	41.6	6	10	-	-	3.70
b)Primary	19	31.6	9	15	-	-		20	33.3	8	13.3	-	-	
c)High school	0	0	1	1.6	-	-		0	0	1	1.6	-	-	
d)Higher secondary	0	0	0	0	-	-		0	0	0	0	-	-	
e)Diploma	0	0	0	0	-	-		0	0	0	0	-	-	
f)Degree	0	0	0	0	-	-		0	0	0	0	-	-	

Income of the family.														
a)<Rs 5,000	29	48.3	2	3.3	-	-	15.2*	29	48.3	2	3.3	-	-	11.7*
b)Rs 5,001-Rs10,000	14	23.3	15	25	-	-		16	26.6	13	21.6	-	-	
c)>Rs 10,001	0	0	0	0	-	-		0	0	0	0	-	-	
Area of residence														
a)Rural	32	53.3	3	5	-	-	16.1*	32	53.3	3	5	-	-	12.0*
b)Urban	0	0	0	0	-	-		0	0	0	0	-	-	
c)Semi urban	11	18.3	14	23.5	-	-		13	21.6	12	20	-	-	
Previous of information														
a)Health personnel	0	0	0	0	-	-	8.3	0	0	0	0	-	-	11.2
b)Friends	14	32.3	4	6.6	-	-		12	20	3	5	-	-	
c)Relatives	0	0	0	0	-	-		0	0	0	0	-	-	
d)Mass media	12	20	11	18.3	-	-		12	20	11	18.3	-	-	
e)None of the above	20	33.3	2	3.3	-	-		21	35	1	1.6	-	-	

*significant

H_0 - there is no significant association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in control group with their selected demographic variables.

TABLE 4.12 Shows the association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in control group with their selected demographic variables.

The analysis revealed that there is a significant association between the children's Age, Gender ,Income of the family, Area of residence and Previous source of information of pre test level of knowledge and there was no significant association between the Education of the father and as well as the mother .Where as in pre test levels of attitude revealed that there was a significant association with the children's Gender , Income of the family, and

Area of residence and there is no significant association of Age, and Education of the father and as well as the mother and Previous source of information in the control group at the significance of 0.05 level.

CHAPTER - V

DISCUSSION

CHAPTER – V
DISCUSSION

This chapter deals about the discussion of the study based on the objectives and the hypothesis of the study with the appropriate statistical analysis and the findings of the study.

The study was a quasi experimental – non equivalent (pre test post test control group)design. The problem stated as " A study to assess the effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the rural school children at selected rural schools, Thanjavur, Dt.

The study was conducted for 120 students in which 60 students are assigned to experimental group and 60 students are assigned to control group. Rural schools are selected by total population sampling technique. The study was conducted among the eighth standard rural school children.

Samples are selected by using total sampling technique. Pre test was conducted by using the semi structured knowledge questionnaire to assess the knowledge and attitude of the students was assessed by using likert scale for both group . II day computer assisted instruction was given to the students only to the experimental group . After one week the post test was conducted by using the same questionnaire and likert scale for experimental and control group.

The first objective to assess the knowledge and attitude regarding hazards of use of plastic products among the rural school children in experimental and control groups.

Assessment of pre test levels of knowledge regarding the hazards of use of plastic revealed that 41(68.66%) of the student had inadequate knowledge and 19(31.66%) of the students had moderately adequate knowledge in

experimental group regarding hazards of use of plastic products.In the control group 43(71.66%) of the student had inadequate knowledge and 17(28.66%) of the students had moderately adequate knowledge and none of them had adequate knowledge in both the experimental and control group regarding hazards of use of plastic products.

Assessment of post test levels of knowledge revealed that none of them had inadequate knowledge ,18(30%) had moderately adequate knowledge and 42(70%) had adequate knowledge in experimental group . Where as I the control group 41(68.33%) had adequate knowledge and 19(31.66%) had moderately adequate knowledge . And the post test levels of attitude revealed that none of them had adequate attitude ,21(35%) had moderately adequate attitude and 39(65%) had adequate knowledge in experimental group . Where as in the control group 43(71.66%) had inadequate attitude and 17 (28.33%) had moderately adequate attitude and none of them of had adequate attitude in control group .

Hence the experimental group had improved their knowledge and attitude regarding hazards of use of plastic products.

The second objective to evaluate the effectiveness of Computer Assisted Instruction regarding the hazards of use of plastic products among the rural school children in experimental and control groups.

In experimental group the pre test and post test scores of knowledge revealed that mean value 8.58 with standard deviation 2.88 of pre test has significant to the post test mean value 19.06 with standard deviation 3.39 and the 't' value CV = 24.11and TV = 2.0010 (CV > TV) which is significant at 0.05 level . In the pre test and post test scores of attitude pre test and post test levels of attitude reveals that mean value 19.78 with standard deviation 7.07 of pre test has significant to the post test mean value 42.76 with standard deviation 13.45 and the 't' value CV = 16.00 and TV = 2.0010 (CV > TV) which is significant at 0.05 level. Hence the given CAI was effective .

In the control group the pre test and post test scores of knowledge revealed that mean value 9.18 with standard deviation 3.44 of pre test has significant to the post test mean value 8.50 with the standard deviation 2.77 and the 't' value CV = 1.8348 and TV = 2.0010(CV>TV) the pre test mean 18.61 with standard deviation 3.93 which is significant to the post test mean value 19.3 with standard deviation 8.3 and the 't' value CV = 1.1217 and TV = 2.0010 (CV>TV) which is not significant at 0.05 level.

Hence the research hypothesis H_1 states that there is a significant difference between the pre and post test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children was accepted with the experiment group but the same it is rejected to the control group.

The third objective to compare the pre and post test levels of knowledge and attitude between the experimental and control groups regarding hazards of use of plastic products among the rural school children.

In the pre test mean levels of knowledge of experimental group 8.58 with SD 2.88 and for the control group 9.18 with SD 3.44 and the projected 't' value CV = 1.03 and TV = 2.001 (CV < TV) at 0.05 level. In the pre test mean levels of knowledge of experimental group 19.06 with SD 3.39and for control group 8.50 with SD 2.77and the projected 't' value CV = 20.37and TV = 2.001 (CV < TV) at 0.05 level .

In the pre test mean levels of attitude of experimental group 19.78with SD 7.07 and for the control group 18.61with SD 3.93and the projected 't' value CV = 1.58 and TV = 2.001 (CV < TV) at 0.05 level. In the pre test mean levels of attitude of experimental group 42.76 with SD 13.45 and for control group 19.3 with SD 8.3 and the projected 't' value CV = 17.79and TV = 2.00 (CV < TV) at 0.05 level .

Research hypothesis H_2 states that there is a significant difference in the post test levels of knowledge and attitude between the experimental and control group regarding hazards of use of plastic products among the rural school children. Hence the research hypothesis H_2 was accepted but the same it is rejected to the pre test levels of knowledge and attitude between the experimental and control group.

The fourth objective to correlate the post test scores of knowledge and attitude of rural school children regarding the hazards of use of plastic products among the rural school children in experimental and control groups.

The experimental group the mean post test value of knowledge was 19.06 with SD 3.39 and for attitude the value was 42.76 with SD 13.45 And the 'r' value 0.8 it revealed that there was a positive and highly significant correlation . Where as in control group the mean post test value of knowledge was 8.50 with SD 2.77 and in attitude the mean value 19.3 SD 8.30 and 'r' value 0.3 It revealed that there was a positive and moderate correlation between post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children .

The fifth objective to determine the association between the pre test levels of knowledge and attitude regarding first hazards of use of plastic products among the rural school children with their selected demographic variables in experimental and control groups.

In the experimental group there was no significant association between the pre test levels of knowledge with the father's education, mother's education, Where as in attitude there was no significant association in gender ,father's education ,mother's education and area of residence. In the control group there was no significant association between the pre test levels of knowledge with the father's education, mother's education and previous source of information .Where as in attitude there was no significant association in

father's education, mother's education and previous source of information . So the research hypothesis H_4 was rejected.

Hence in experimental group there was a significant association between the knowledge with age, gender, income of the family ,area of residence and previous source of information and for attitude there was a significant association with age, income of the family and previous source of information. Where as in control group there was a significant association with in the knowledge level age, gender, income of the family ,area of residence and previous source of information and there was a significant association with age ,gender ,income of the family in the attitude so H_4 was accepted.

CHAPTER –VI

SUMMARY & CONCLUSION

CHAPTER –VI

SUMMARY AND CONCLUSION

SUMMARY

The present study was conducted to assess the knowledge and attitude of school children regarding hazards of use of plastic products. The study was a quasi experimental – non equivalent (pre test post test control group) design. A total 120 students (60 students experiment group and 60 students in control group)who meet the inclusion and exclusion criteria as the samples selected from the rural schools, Thanjavur , Dt. The samples where selected by total population sampling technique. The investigator first introduced herself to the samples and developed the communication with them. After the selection of Samples the interview conducted with the instruments .

The statistical analysis revealed the knowledge and attitude of the experiment group was calculated by the paired 't' test for knowledge ('t' =24.11) and for attitude ('t' =16.00). This proves that there was a significant difference in pre test and post test levels of knowledge and attitude for the experiment group at 0.05 level. Where as in control group the knowledge level was ('t' =1.83) indicates no difference in knowledge and for attitude ('t' =1.12) was revealed there was no difference in pre and post test attitude for the control group at 0.05 level. So the given CAI was effective.

The statistical analysis for the comparison of knowledge and attitude of the experiment group and the control group was calculated by the unpaired 't' test for pre test knowledge ('t' =1.08) it showed no difference in knowledge and for attitude ('t' =1.56). This proved that there is a no significant difference in attitude . Where as in post test the knowledge level was ('t' =20.37) and for attitude('t' =17.79) this revealed that there is a significant difference in post test knowledge and expressed practice for the experiment and control group.

The statistical analysis for correlation between the post test scores of knowledge and attitude of the experiment and control group was calculated by "Karl Pearson correlation test" stated that in experimental group the post test scores of knowledge mean value is 19.06with SD 3.39and the post test scores of attitude the mean value is 42.76 with SD 13.45. And the 'r' value (r =0.8) it revealed that there is a positive and highly significant correlation between the knowledge and attitude regarding hazards of use of plastic products. In control group the mean post test value of knowledge was 8.50 with SD 2.77and in attitude the mean value 19.3with SD 8.3and 'r' value (r = 0.3) it revealed that there was a positive and moderate significant correlation between the knowledge and attitude regarding hazards of use of plastic products.

The statistical analysis determined the association between the pre test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children with their selected demographic variables was calculated by using 'chi square test'. The results were stated that in experiment group towards the knowledge there is a significant association with age, sex, income of the family residence , previous source of information and attitude there is a significant association with age, , income of the family, previous source of information .Where as in control group towards the knowledge level there is a significant association with age, income of the family, residence, and attitude level there is a significant association with sex, residence, income of the family.

CONCLUSION

The main objective of the study was to determine the effectiveness of Computer Assisted Instruction on knowledge and attitude regarding hazards of use of plastic products among the rural school children at selected rural schools, Thanjavur, Dt. The statistical analysis revealed that there was a significant difference between the pre test and post test level of the knowledge

and attitude of experiment group ,thus indicated the given Computer Assisted Instruction was effects.

NURSING IMPLICATIONS

The present study had certain nursing implication towards the nursing education , nursing practice ,nursing administration and nursing research as follows.

NURSING EDUCATION

The nursing education is framed such a way that it equip the nurses with the essential knowledge ,attitude and skills for meeting the needs of the society at primary , secondary and tertiary levels.

The nursing curriculum also include the hazards of plastic usage in child health nursing .

It help them the to know the mortality and morbidity in children , needs to take action to avoid using of plastic products.

NURSING PRACTICE

The nurses working in different health care setting play a vital role in enhancing the quality of life of individual and family members especially in paediatric care unit.

This study will help the paediatric care unit nurses develop their knowledge & skill in using equipment's while treating the children . It also help the nurses to create awareness among the hospitalized children .

The community health nurse participate in school health programmes to give health education to the students regarding the hazards of plastic products use.

NURSING ADMINISTRATION

The nursing administration should make necessary initiatives of :

- Collaborate with governing bodies to formulate standard policies and to emphasize the policies to the society.
- Organize the seminars , workshop, conferences regarding plastic hazards and proper disposal of waste among the nursing staffs and as well as in student nurses .

NURSING RESEARCH

- Promote more research on hazards of plastic use among the various settings.
- Disseminates the findings of the research through conferences , seminars and publishing in the journals.

RECOMMENDATIONS

- The comparative study can also be done to assess the effectiveness of CAI among rural and urban school children.
- The study can be done on large sample size to generalize the effectiveness of CAI.
- An experimental study can be done to assess the effectiveness of CAI / STP regarding hazards of use of plastic products among the mother's of school children.

REFERENCES

REFERENCES

TEXT BOOK REFERENCES

1. Arora, P.N .,& Malhan, P.K . (2010) *Biostatistics.* 2nd Edition . New Delhi: Himalaya Publishing House.
2. Burns.(1993). *The Practice of Nursing Research Conduct, Critique and Utilization.*2nd Edition. Philadelphia: W.B Saunders Company
3. Barbara Sattler,RN ,Dr PH .*Environmental Health and Nursing Practice.* Springer publication.
4. Basavanthappa , B.T . (2007). *Nursing Research* . 2nd Edition. New Delhi : Jaypee Publication.
5. Chin J.(2008).*Theory and Nursing A systematic Approach* . London: Mosby publication.
6. Collet Clifford., & Louis Harum.(2000). *Inferential Statistics in Nursing and Health Care.* 1st New York: Churchill Livingston Publication.
7. Dr. Vasundhra Tulasi .T. (2011). *Nursing Research and Statistics*. 1st Hyderabad: Frontline Publication.
8. D.V.Rosato.,& Marlene, G. Rosato . (2000) . *Concise Encyclopaedia of Plastics.* Springer Science Bussines Media :New York.
9. Denis . F. Polit .,& Chery Tetana Beck .(2004) . *Nursing Research.* 7th Edition . Philadephia : Lippincott Williams and Wilkins.
10. Elakkuvana Bhaskara Raj. D. (2012) . *Nursing Research and Bio Statistics*. 2nd Edition . Bangalore: EMMESS publication.
11. Fawcent .(2008). *Analysis and Evaluation of Conceptual Models of Nursing* . New Delhi : F .A .Davis Company.
12. Gatins DE, et,al., (2003) *Research Methodology and Techniques*.4th Edition . New Delhi: International Publishers.
13. Gupta ,S.P .(2003). *Statistical Methods.* 31st Edition . India: Sultan Chand Educational Publication.

14. Guru Mani. N. (2010). *An introduction to Biostatistics.*2nd Edition . Chennai: MJP Publication.
15. Hesinssen.,et al (2000). *Intervention Research.*1st Edition Philadelphia: Routledge Publishers.
16. Jacqueline. (2000). *Analysis and Evaluation Of Contemporary Nursing Knowledge, Nursing Models And Theories.* 2nd Edition . Philadelphia: F.A Davis Company.
17. Herman Koren ,R.E.H.S.,M.P.H.,H.S.D.,(1995) .*Handbook of Environmental Health* .Lewis publication.
18. Himmat Singh.(2001). *Green Revolution Reconsidered* . New York : Oxford publication.
19. Jacqueline. (2000). *Analysis and Evaluation Of Contemporary Nursing Knowledge, Nursing Models And Theories*. 2nd Philadelphia: F.A Davis Company.
20. Janet Houser. (2011). *Nursing research*. 1st . New Delhi: Jones and Bartlett India Pvt. Ltd.
21. J.M.G. Cowie . *Polymers : Chemistry & and Physics of Modern Materials.* Nelson Thornes publication.
22. Kothari ,B, et al., (1998). *Research Methodology Methods and Techniques.* Wiler Estern Limited.
23. Mahajan B .K. (1997) . *Methods in Biostatistics*. 8th Edition . New Delhi : Jaypee publication.
24. Potter ,& Perry .P. (2009) . *Basic Nursing Theory and Practices* . 9th Edition. USA Mosby publications.
25. Purohit ., & Kakrani . *Air Environment and Pollution*. India : Ayrabios.
26. Suzanne . M. Snedeker .(2014) . *Toxicants in Food Packaging and Household Plastic* : *Exposure and Health Risks to consumers* . London : Springer – Verlag .

27. Sundar.Rao . P.S.S .,& Richard .J.(2006).*Introduction to Biostatistics and Research Methods.* 4th Edition . New Delhi : Prentice Hall.
28. Suresh .K. Sharma. (2012) . *Nursing Research and Statistics* .India: Elsevier publication .
29. T.R. Grompton M. SC ., F.R.I.C., M.Anal.Chem. *Additive Migration From Plastic Into Food.* (2013) . New York : Oxford publication.
30. V.K.Ahluwalia .(2004).*New Trends In Green Chemistry*. M. Kidwai publication.
31. Wasley .L.Ruby. (1995) . *Nursing Theories and Models* . 2ndEdition . New Delhi : Spring House Corporation .

JOURNAL REFERENCES

1. Alexannder G.J.Driedger et al .,(2015) Plastic debris in the Laurentian Great Lakes: A Overview. *Journal of Great Lakes Research.* Mar.Vol41(1), 9-19.
2. Antonia M Calafat,(2009) Exposure to Bisphenol A and other phenols in Neonatal Intensive Care Unit Premature Infants .*Journal of Environmental Health Perspectives* **.**Apr .Vol -117(4), 639-644.
3. Anwar Johari et al.,(2014).Municipal Solid Waste Management and Potential Revenue from Recycling in Malaysia. *Journal of Modern Applied Science.* June . Vol – 8(4),37-48.
4. Bhandari R, Xiao J and Shankar A. (2013) . Urinary bisphenol A and obesity in U.S. children. *American Journal of Epidemiology* **.** Jun. Vol -177(11) , 1263-70.
5. Bittner GD, Yang CZ and Stoner MA. (2013) . Estrogenic chemicals often leach from BPA-free plastic products that are replacements for BPA-containing polycarbonate products. *Journal of Environmental Health : a global access science source***.** May.Vol -13(1) ,41.

6. Cherly Erler , Julie Novak .(2013) . Bisphenol- A and Exposure : Human Risk and Health Policy . *Journal of Paediatric Nursing* .July.vol-25(5),400-407.
7. Delilah Lithner et al., (2011) . Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition. *Journal of Science of The Total Environment***.** Aug .Vol-439(180), 3309–3324.
8. Fauziah S.H, Liyana IA, Agamuthu P.(2012). Plastic debris in the coastal environment: The invincible threat? Abundance of buried plastic debris on Malaysian beaches. *Journal of Waste Management Resource.* Jun.
9. Ferderiksen H et al., (2013)**.** Urinary excretion of phthalate metabolites, phenols and parabens in rural and urban Danish mother-child pairs. *International Journal of Hygiene and Environmental Health*. Nov. Vol -216 (6) , 772-83.
10. Garcia E, Hurley S, Nelson Do, Hertz A and Reynolds P.(2015).Hazardous air pollutants and breast cancer risk in California teachers: a cohort study. *Journal of Environmental Health : a global access science source.* Jan .Vol – 14(1) , 14.
11. Hoarau L, Ainley L, Jean C, Ciccione S **.**(2014). Ingestion and defecation of marine debris by loggerhead sea turtles, Caretta caretta, from by-catches in the South-West Indian Ocean. *Journal of Marine Pollution Bulletin.* July . Vol -84(1).90-96.
12. Jhonson C et al ., (2013) . Prenatal and early childhood bisphenol A concentrations and behaviour in school-aged children. *Journal of Environmental Science* . Oct .Vol – 126 , 43-50.
13. Josyula S et al ., (2015). Household air pollution and cancers other than lung: a meta-analysis. *Journal of Environmental Health : a global access science source***.** March. Vol -14 , 24.

14. Klein S, Worch E, Knepper TP.(2010). Occurrence and Spatial Distribution of Micro plastics in River Shore Sediments of the Rhine-Main Area in Germany. *Journal of Environmental & Science Technology.* May.
15. Losa-Ward SM et al.,(2012) **.** Disrupted organization of RFamide pathways in the hypothalamus is associated with advanced puberty in female rats neonatally exposed to bisphenol A. *Journal of Biology of Reproduction* .Aug. Vol -87(2),28.
16. Nelson JW et al ., (2012) . Social disparities in exposures to bisphenol A and polyfluoroalkyl chemicals: a cross-sectional study. *Journal of Environmental Science : a global access science source* . Mar. Vol -11,10.
17. Neeti Rustagi , S. K. Pradhan and Ritesh Singh ,(2011). Public health impact of plastics: An overview **.***Indian Journal of Occupational & Environmental Medicine* **.**Sep-Dec. Vol -15(3) , 100-103.
18. Mr. Mangesh .V. Jabade , Amey.M. Khande. A study to assess the knowledge regarding the hazards of plastic use among adolescent students of selected high school, Belgam with a view to develop an informational booklet. *International Journal of Scientific Research.* May. Vol 4(5),
19. Mandy Fishes et al., (2015) .Bisphenol - A and phathate metabolite urinary concentration : Daily and a cross pregnancy variability . *Journal of Exposure Science and Environmental Epidemiology.*
20. Marcus Eriksen et al., (2014).Trash researcher tallies ocean pollution *.Journal of Public Library of Science One***.** Dec. Vol-187,4.
21. R.k.Srivastava and Sushila Gorara , (2013*)* .Use of polycarbonate plastic products and human health. *International Journal of Basic & Clinical Pharmacology* .Vol - 2(1), 12-17.

22. Ramji. K , Bhandari et al., (2014) . Trans generational effects from early developmental exposures to Bisphenol –A or 17α-ethinylestradiol in medaka. *Journal of Scientific Reports***.** Nov .
23. Singh M.k .and Singh Retta Devi,(2013) . Hazards of plastic bags in dholpur. *International Journal of Environmental Science* **.**Mar.Vol-2(3), 6-10.
24. Soliman AS (2013), Bisphenol A-associated epigenomic changes in prepubescent girls: a cross-sectional study in Gharbiah, Egypt. *Journal of Environmental Science : a global access science source* .Apr. Vol- 12, 33.
25. Stephanie L. Wright et al ., (2013) . The physical impacts of micro plastics on marine organism: A review . *Journal of Environmental Pollution* .July .Vol 178, 483-492.
26. Vandenberg LN et al.,(2013) . Human exposures to bisphenol -A:mismatches between data and assumptions. *Journal of Review of Environmental Health.*Vol -28(1) ,37-58.
27. Mrs .Suja Santosh P.S .(2012) ,Pastic pollution :An Environmental Hazards. *Journal of Health Action*. Sep.
28. Takseen A ,Naeem I and Atif M.,(2012). Evaluation of Bisphenol -A Contents : A case study. *West Indian Medical Journal* **.**Nov .Vol -61(6).

REPORTS

The Times of India 2013

Environmental Health Prospective -October 6

Annual Review of Public Health 2010

Health Day News 2013

Annual Reviews Mobile 2010

The Environmental Health News 2009

NET REFERENCES

www.sciencedirect.com/science/s0380133015000064

www.gooleweblgh.com/theglobal journals.com

www.timesofindia.com/home/enviroment/pollution/plasticwaste

www.journalelsevier.com

www.annualreviews.org/toc/pubhealth/31/1

www.pubmed.com

www.nature.com

www.encylopedia.com

www.sustainableplastics.org

www.goodhousekeeping.com/-of-plastic

www.grainer.com/content/at-types-of-plastic

www.profeessionalplastic.com/plastic

www.norden.org

ANNEXURE

REQUISITION FOR VALIDITY

FROM

Mrs. JAYANTHI , II year M.Sc(N),

Our Lady of Health College of Nursing ,

Thanjavur.

(Through Principal)

TO

_____

_____

RESPECTED MADAM /SIR,

Subject : Requisition for content validity regarding the hazards of use of plastic products.

I am M.Sc. Nursing student of Our Lady of Health College of Nursing . Thanjavur . As part of my course . I am doing a study on the topic mentioned below.

TOPIC : "A study to assess the effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the school children at selected rural schools, Thanjavur ,Dt."

May I request you to go through and validate the content regarding hazards of use of plastic products. Please enlighten me with your valuable suggestion for modifying the computer assisted instruction .

Thanking you in anticipation

Place : Yours sincerely ,

Date: Ms .S. Jayanthi.

LIST OF EXPERTS

MEDICAL EXPERTS

1. **Dr .Thangasaravanan.M.D., Pediatrics.**
   Consultant Paediatrician,
   Our Lady of Health Hospital,
   Thanjavur.
2. **Dr . B.Rajesh .M.B.B.S, D.C.H.**
   Consultant Paediatrician.
   Our Lady of Health Hospital,
   Thanjavur**.**

NURSING EXPERTS

1. **Mrs . Sujatha M.Sc (N) . Ph .D.,**
   Associate Professor,
   PIMS College of Nursing,
   Pondicherry.
2. **Mrs . Parasakthi M.Sc (N),**
   Vice Pricipal,
   Dr .G . Sakunthala College of Nursing,
   Trichy.
3. **Mr. Venkatesen M .Sc (N),**
   Associate Profeesor,
   Vinayaka Mission College of Nursing,
   Pondicherry.

TOOLS – SEMI STRUCTURED QUESTIONNAIRE

PART - I - DEMOGRAPHIC VARIABLES

Sample No :_____

1. Age of the student

   a) 13 years

   b) 14 years

   c) 15 years

2. Gender

   a) Male

   b) Female

3. Education of the father

   a) Illiterate

   b) Primary

   c) Secondary

   d) Higher secondary

   e) Diploma

   f) Degree

4. Education of the mother

   a) Illiterate

   b) Primary

   c) Secondary

d) Higher secondary

e) Diploma

f) Degree

5. Monthly income of the family

a) Below Rs 5,000

b) Rs 5,000-10,000

c) Above Rs 10,000.

6. Area of residence

a) Rural

b) Urban

c) Semi –urban

7. Previous source of information

a) Health professionals

b) Friends and relatives

c) Mass media

d) None

PART– II - SEMISTRUCTRUED KNOWLEDGE QUESTIONNAIRE

1. How many types of plastics are there?

   a. 2

   b. 4

   c. 6

2. Which type of plastic softens and melts in heat?

   a. Thermoset

   b. Thermocline

   c. Thermo plastics

3. What is the expansion of PVC?

   a. Polyvinyl chloride

   b. polyvinyl carbon

   c. polyvinyl chromite

4. How many types of polyethylene plastics are there ?

   a. 4

   b. 2

   c. 6

5. Which plastic is used for making cookware?

   a. Teflon

   b. Polyvinyl chloride

   c . Polypropylene

6. which plastic is used for making zippy cups and water bottles ?

a. Polyvinyl chloride

b. Nylon

c. Bisphenol – A

7. Which one of the following plastic products used by school children's ?

a. Syringes and Containers

b. Water bottles and Tiffin boxes.

c. Bottles and Syringes

8. How many years do take for the degradation of plastic materials?

a. 4-10 years

b. 40-100 years

c. 400-1000 years

9. Which among the household waste is hazardous to health?

a. Wooden items

b .Glass items

c. Plastic items.

10. Which of the following disease is caused by plastics?

a. Skin disease and cancer

b. Diarrhoeal disease and abdomen distension

c. Typhoid and dengue

11. How the plastic may affect the children?

a. Causes kwashiorkor

b. Causes marasmus

c . Causes obesity

12. What is the chemical name for building block of " Polycarbonate" plastics ?

a. Bakelite

b. Bisphenol-A

c. Epoxy.

13. Which one of the behavioural problems caused by bisphenol –A?

a. Attention deficit hyperactivity disorder & Autism

b. Enuresis & Encopresis disorders

c. Speech & Sleep disorder

14 . What health problem is caused by bisphenol –A in girls ?

a. Early onset of puberty

b. Delayed onset of puberty

c. Not attain puberty

15. What is the risk associated with plastic use?

a. Breast cancer

b. Blindness

c. Deafness

16. What is the name of the layer formed by non –degraded plastics in the ocean?

a. Curdles

b. Nurdles

c. Hurdles

17. What is the effect of bio –degradable plastics?

a. Nitrogen emission

b . Cadmium emission

c . Methane emission

18. What is the symbol of recycle?

a. 

b. 

c. 

19. What is the recycle code of polypropylene plastics?

a .4

b. 1

c. 5

20. What is the recycle code of Bisphenol –A?

a. 1

b. 7

c. 3

21. Which recycle code of plastic should be avoided ?

a. 3, 6 & 7

b. 2, 4.& 5

c. 1, 2 & 4

22. Which recycle code of plastic is safe for food storage?

a. 1,2 ,3,& 4

b. 1,2, 4,& 5

c. 1,3, 4 & 5

23. What is the thickness of carry bags to be easily degraded?

a. Less than 40 micron

b. 40 micron

c. More than 40 micron

24. What is the European standard symbol denotes safe plastic use ?

a. CE

b. EC

c. CC

PART - III - ATTITUDE QUESTIONNAIRE

ITEM	Strongly Disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly Agree 5
1. Excessive use of plastic materials cause problems to our health and environment. 2. Some of the plastic materials made up of harmful chemicals. 3.Stainless steel & paper bags can be used instead of plastic materials . 4. Recycling of plastic materials can minimize the environmental hazards. 5. Checking the recycle codes of plastic materials before use is necessary. 6. Reduce the use of plastic materials to minimize the health hazards by using wooden ,metal &paper materials. 7. Carry bags not used for storing hot and cold drinks. 8. Plastic debris is not a cause global warming. 9. The food items not to kept in the plastic containers for refrigeration. 10. Usage of plastic materials causes miscarriage. 11.Strict legislations minimize the health plastic use. 12. plastic chemicals affect the growth and development of children.					

KEY ANSWERS

1	a	13	a
2	c	14	a
3	a	15	a
4	b	16	b
5	a	17	c
6	c	18	c
7	b	19	c
8	b	20	b
9	c	21	a
10	a	22	b
11	c	23	c
12	b	24	a

பிரிவு -1 - தனி நபர் விபரம்

குறிப்பு : கீழ் வரும் கேள்விகளை கவனமாக படித்து பொருத்தமான இடத்தில் குறியிடவும். தங்களின் பதில்கள் நம்பிக்கையுடன் வைத்துக்கொள்ளபப்படும் . இது ஆராய்ச்சி தேவைக்காக மட்டும் பயன்படுத்தப்படும்.

பங்கேற்பாளர் எண்:

1) மாணவரின் வயது .

அ)13 வயது

ஆ)14 வயது

இ)15 வயது

2) பாலினம்.

அ)ஆண்

ஆ) பெண்.

3) தந்தையின் கல்விநிலை.

அ) படிப்பறிவு இல்லாதவர்

ஆ) தொடக்கக்கல்வி

இ) உயர் நிலை கல்வி

ஈ) மேல் நிலை கல்வி

உ) பட்டய படிப்பு

ஊ) பட்டபடிப்பு

4) தாயின் கல்விநிலை.

அ)படிப்பறிவு இல்லாதவர்

ஆ) தொடக்கக்கல்வி

இ) உயர் நிலை கல்வி

ஈ) மேல் நிலை கல்வி

உ) பட்டய படிப்பு

ஊ) பட்டபடிப்பு

5) குடும்பத்தின் மாத வருமானம் .

அ)ரூ-5,000 திற்கு கீழ்

ஆ) ரூ -5,001-10,000

இ) ரூ 10,001 திற்கு மேல்.

6. குடியிருப்பு பகுதி .

அ) கிராமம்

ஆ) நகரம்

இ) நகரம் சார்ந்த

7. முந்தைய தகவல் மூலம் .

அ) உடல் நலம் சார்ந்த தொழில் புரிபவர்

ஆ) நண்பர்கள்

இ) உறவினர்கள

ஈ) ஊடகங்கள்

உ) இவை எதுவுமில்லை

பிரிவு -II

பிளாஸ்டிக் பயன்படுத்துவதால் ஏற்படும் தீமைகள் குறித்த அறிவுத்திறனை கணிக்கும் கருவி /பிளாஸ்டிக் பற்றிய பொதுவான தகவல்.

1) எத்தனை வகையான பிளாஸ்டிக் உள்ளன?

அ) 2

ஆ) 4

இ) 6

2) வெப்பபடுத்தும் போது வளைவதும் மற்றும் உருகும் பிளாஸ்டிக் எந்த வகையை சார்ந்தது?

அ) தெர்மொசெட்ஸ்(thermosets)

ஆ)தெர்மொகளின் (thermocline)

இ)தெர்மோ பிளாஸ்டிக் (thermoplastic)

3) பி.வி.சி (P.V.C) விரிவாக்கம் என்ன?

அ)பாலிவினைல் குளோரைட். (Polyvinyl chloride)

ஆ)பாலிவினைல் கார்பன் (Polyvinyl carbon)

இ)பாலிவினைல் குரொமைட் (Polyvinyl chromite)

4) பாலி எத்திலினில் எத்தனை வகைகள் உள்ளன ?

அ) 4

ஆ) 2

இ) 6

5) சமைப்பதற்கான பொருட்கள் தயாரிப்பதில் எந்த வகையான பிளாஸ்டிக் பயன்படுகிறது ?

அ) டெப்லான் (Teflon)

ஆ) பாலிவினைல் குளோரைட்(Polyvinyl chloride)

இ) பாலிப்ரொப்ய்லின் (Polypropylene)

6) உறிஞ்சு டம்ளர் மற்றும் தண்ணீ ர் பாட்டில் தயாரிப்பதில்வகையான பிளாஸ்டிக் பயன்படுகிறது ?

அ) பாலிவினைல் குளோரைட் (Polyvinyl chloride)

ஆ) நய்லோன் (Nylon)

இ) பிஸ்பினால் - எ (Bisphenol – A)

7) பின்வருவனவற்றுள் பள்ளி செல்லும் குழந்தைகளால் பயன்படுத்தப்படும் பிளாஸ்டிக் பொருட்கள் எவை ?

அ) ஊசிகள் மற்றும் டப்பாக்கள்

ஆ) தண்ணீ ர் பாட்டில் மற்றும்

இ) பாட்டில் மற்றும் ஊசிகள் .

8) பிளாஸ்டிக் பொருட்கள் மக்குவதற்கு எத்தனை வருடம் எடுத்துகொள்கின்றன?

அ) 4-40 வருடம்

ஆ) 40 -100 வருடம்

இ) 400-1000 வருடம்

9) வீட்டு கழிவுகளில் எந்த கழிவுகள் உடல் நலத்திற்கு தீமை விளைவிக்கும்?

அ) மரக்கழிவு

ஆ) கண்ணாடி கழிவு

இ) பிளாஸ்டிக் கழிவு

10) கீழ்கண்டவற்றுள் எந்த நோய் பிளாஸ்டிக்கினால் ஏற்படுகிறது?

அ) தோல் நோய் மற்றும் புற்று நோய்

ஆ) வற்றுபோக்கு மற்றும் வயிறு உப்புதல்

இ) டைஃபாய்டு மற்றும் டெங்கு

11) பிளாஸ்டிக் குழந்தைகளை எவ்வாறு பாதிக்கிறது.

அ) காய்ச்சல் காரணியாகிறது

ஆ) உடல் எடை குறைவு காரணியாகிறது

இ) உடல் பருமன் காரணியாகிறது

12) பாலிகார்போனட் பிளாஸ்டிக்கின் வேதிப்பொருள் தொகுதி பெயர் என்ன?

அ) பாக்கிளிடே (Bakelite)

ஆ) பிஸ்பினால் -எ (Bisphenol – A)

இ) எபோக்ஸ்சி (epoxy)

13) பிஸ்பினால் -எ யினால் எந்த நடத்தை பிரச்சனை உருவாகிறது?

அ) கவன பற்றாகுறை உயர் நடவடிக்கை நோய் மற்றும் மன இருக்கம்.

ஆ) தன்னை அறியாமல் சிறுநீர் மற்றும் மலம் கழித்தல் .

இ) பேசுதல் மற்றும் உறங்குவதில் குறைபாடு

14) பிஸ்பினால் -எ யினால் பெண்களுக்கு என்ன உடல் நல குறைபாடு ஏற்படுகிறது?

அ) சிறுவயதில் பருவமடைதல்

ஆ) தாமதமாக பருவமடைதல்

இ) பருவமடையாமல் இருத்தல்

15) பிளாஸ்டிக் பயன்படுத்துவது தொடர்பான அபாயம் என்ன ?

அ) மார்பக புற்றுநோய்

ஆ) கண்பார்வை இழப்பு

இ) செவிடுதன்மை

16) கடலின் மேற்பரப்பில் மக்காத பிளாஸ்டிக்கினால் ஏற்படும் அடுக்கின் பெயர் என்ன?

அ) கர்டுல்ஸ் (curdles)

ஆ) நர்டுல்ஸ் (nurdles)

இ) ஹர்டுல்ஸ் (hurdles)

17) உயிர் -மக்கும் பிளாஸ்டிக் விளைவு என்ன ?

அ) நைட்ரோஜென் மாசு

ஆ) காட்மியம் மாசு

இ) மீத்தேன் மாசு

18) மறுசுழற்சி குறியீடு என்ன?

அ) 

ஆ) 

இ) 

19) பாலிப்ரொபைலின் பிளாஸ்டிக்கின் மறுசுழற்சி குறியீடு எண் என்ன?

அ) 4

ஆ) 1

இ) 5

20) பிஸ்பினால் - எ பிளாஸ்டிக்கின் மறுசுழற்சி குறியீடு எண் என்ன?

அ) 1

ஆ) 7

இ) 3

21) எந்த மறுசுழற்சி குறியீடு எண் கொண்ட பிளாஸ்டிக்கை உபயோகிக்க கூடாது ?

அ) 3, 6 & 7

ஆ) 2,4 & 5

இ) 1, 2 & 4

22) எந்த மறுசுழற்சி குறியீடு எண் கொண்ட பிளாஸ்டிக்கை உபயோகிக்கலாம் ?

அ) 1 , 2 ,3 & 4

ஆ) 1, 2 ,4 & 5

இ) 1, 3 , 4 & 5

23) எளிதில் மக்கும் தன்மையுடைய பிளாஸ்டிக் பைகளின் தடிமன் என்ன ?

அ) 40 மைக்ரானிற்கு குறைவு .

ஆ) 40 மைக்ரான்

இ) 40 மைக்ரானிற்கு அதிகம் .

24) பாதுகாப்பான பிளாஸ்டிக் உபயோகிப்பதற்கான யுரோபியன் நியமம் என்ன ?

அ) CE

ஆ) EC

இ) CC

பிரிவு - III - அணுகுமுறை கேள்வித்தாள்

	வலுவாக ஒப்பு கொள்ள வில்லை 1	ஒப்பு கொள்ள வில் லை 2	தெளிவு இல்லை 3	ஒப்பு கொள் கிறேன் 4	வலுவாக ஒப்பு கொள்கி றேன் 5
1.பிளாஸ்டிக் பொருட்களை அதிகமாக பயன்படுத்துவது நம் உடல் நலம் மற்றும் சுற்றுச்சூழல் பாதிப்பை ஏற்படுத்துகிறது. 2.பிளாடிக் பொருட்களில் சில பொருட்கள் தீங்கு விளைவிக்கும் வேதி பொருட்களால் தயாரிக்கப்படுகின்றன . 3.பிளாஸ்டிக் பொருட்களுக்கு பதிலாக துருபிடிக்கத எக்கு ,பேப்பர் பை போன்றவற்றை பயன்படுத்தலாம். 4. பிளாஸ்டிக் பொருட்களை மறுசுழற்சி செய்வதன் மூலம் சுற்றுசூழலுக்கு பாதிப்பு ஏற்படுவதை குறைக்கலாம் . 5. பிளாஸ்டிக் பொருட்களை வாங்குவதற்கு முன் பார்த்து வாங்குவது மிகவும் முக்கியம் . 6. பிளாஸ்டிக் பொருட்களுக்கு பதில் மரத்திலான , உலோகத்திலான மற்றும் பேப்பர் பொருட்களை பயன்படுத்துவதினால் உடல் நல பாதிப்பை குறைக்கலாம்.					

7. பிளாஸ்டிக் பைகளில் சூடான மற்றும் குளிர்வான பானங்களை சேகரிக்க பிளாஸ்டிக் பைகளை பயன்படுத்தகூடாது 8. பிளாஸ்டிக் கழிவுகள் உலகம் வெப்பமயமாதலுக்கு காரணமாகிறது 9. உணவு பொருட்களை பிளாஸ்டிக் டப்பாக்களில் போட்டு குளிர்சாதனபெட்டியில் வைக்ககூடாது . 10. பிளாஸ்டிக் பொருட்களை பயன்படுத்துவது கருச்சிதைவை ஏற்படுத்தும். 11. கண்டிப்பான விதிமுறைகள் பிளாஸ்டிக் பயன்பாட்டினை குறைக்கும். 12. பிளாஸ்டிக் வேதிப்பொருள் குழந்தைகளின் வளர்ச்சியினை பாதிக்கிறது.					

COMPUTER ASSISTED INSTRUCTION

ON

HAZARDS OF USE OF PLASTIC PRODUCTS

TOPIC : HAZARDS OF USE OF PLASTIC PRODUCTS.

INSTRUCTION MEDIA : COMPUTER ASSISTED INSTRUCTION.

GROUP : EIGHRH STANDARD RURAL SCHOOL CHILDREN.

TIME :

PLACE :

GENERAL OBJECTIVE:

At the end of the instruction the students of rural school children may gain knowledge about the plastics and their products uses and effects to environment and health &the preventive measures of plastic hazards . They may change their attitude about the plastic product usage and they are reduce to use the plastic products.

SPECIFIC OBJECTIVES:

At end of the instruction,

- explain about the plastic and plastic products.
- explain the effects of plastics on human health.
- explain the effects of plastics on environment.
- list down the recycling code of plastics.
- enlist the preventive measures of plastic hazards.

S. no	Duration	Specific objectives	Content	Teachers activities	Learners activities
1.	2mts		**INTRODUCTION :** A simple walk on any beach, any where , & the plastic waste spectacles is present. All over the world the statistics are ever growing ,staggeringly. Tons &ton of plastic debris is discarded every year . the plastic debris are waste that can vary in size from large containers, fishing nets microscopic plastic pellets or even particles they are discarded every year, every where,polluting lands ,rivers ,coasts ,beaches and oceans .last year an estimated 1,50,000 tons of marine plastic debris ended up on the shores of Japan and 300 tons a day on Indian's coasts. The plastic products and materials are widely in our day to day life. The products which made up of chemicals and the plastic debris are made hazards to our health and environment.	Introduce the topic	Listening
2.	10mts	Explain about the plastic and plastic products.	**PLASTIC AN OVERVIEW:** The word plastic derives from the Greek (plasticos) means fit for moulding and (plastos) meaning moulded. It refers to their malleability or plasticity during manufacture that allow them to be cast , pressed or extruded into on enormous Variety of shapes plats , tubes, bottles ,boxes and much more. Plastic are typically polymers of high molecule weight , and may contain other	Explaining	Listening

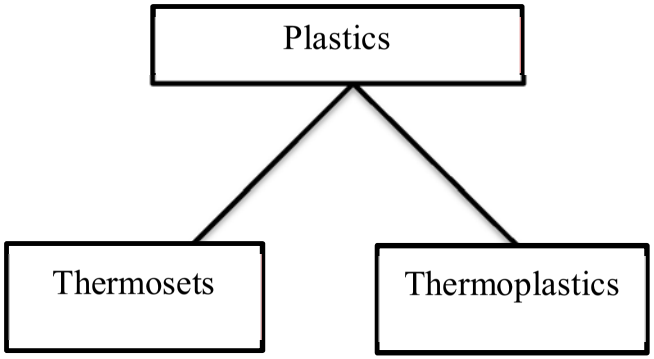
substances to improve the performance and reduce costs.

Plastics takes more time to degraded, they may also pollute the environment and affect our health.

HISTORY OF PLASTICS.:

The first human made plastic was invented by Alexander Parkes in 1855 . He called this plastic parkesine later called celluloid . the development of plastics has come from the use of natural plastic materials (e.g chewing gum, shellac) to the use of chemically modified natural materials (e.g rubber , nitrocellulose , collagen , gallant) and finally to c completely synthetic molecules (e.g Bakelite epoxy , polyvinyl chloride , poly ethylene.) make up the polymers backbone and side chain . Plastic can be classified by the chemical process used in their synthesis . other classification based on that are relevant for manufacture or product design.

TYPES OF PLASTICS:



			THERMOPLASTIC: Thermoplastics will soften and melts if enough heat is applied . Example: Polyethylene, polystyrene ,PTFE. **THERMOSETS:** Thermosets do not soften or melt no matter how much heat is applied. Examples: Polyester, Amino ,Epoxies , Phenolic, Polyimides, Polyurethane, silicone. **THERMOSET PLASTIC TYPES:** **ALKYDS:** Alkyds and chemically modified alkyd resins are the condensation products of poly basic acids and Polyhydric alcohols. They are also oil-modified polyesters because of the presence of vegetable or marine oil or other fatty acids. They are used in the architectural coating ,automotive under body and under- hood coting ,coil coatings , drum, and metal container coating ,electrical industry ,paints. **UREA FORMALDEHYDE &MELAMINE FORMALDEHYDE / AMINO:** Urea formaldehyde are strong ,glossy and durable. They are high mechanical strength ,fire, heat resistance ideal numerous industrial and household application . **EPOXIES:** Epoxy resins are low molecular weight polymers or higher molecular weight . The application for epoxy based materials are extensive and include coatings, adhesives,		

			electrical insulating paints and coating. **PHENOLICS:** The phenolic are combined formaldehyde and phenol .The material called Bakelite . They are water and solvent resistant , could be used as electrical insulator , electronics and telephones ,radios ,records. **PLOYMIDES:** Polyimides are the macromolecule with repeating units of linked by amino bonds when compared to most other organic or polymeric exceptional combination of thermal stability, mechanical toughness chemical resistance used in aircraft parts , wear ships, thrust washers . **POLYURETHENE :** They are durable elastomers and high performance adhesives and sealants ,fibres, seats , gaskets also called as urethanes. **SILICONE:** Silicone are polymers that include any inert ,synthetic compound made up of reparative units of Silicones. They are typically heat resistance and rubber-like and are used in sealants ,adhesives, lubricants medicine cooking utensils and thermal and electrical insulation.		

			THERMOPLASTICS: **POLYVINYL CHLORIDE (PVC):** PVC has side chains incorporating chlorine atoms, which form strong bonds . PVC can also be softened with chemical processing ,and in this form it is now used for shrink – wrap , food packaging and rain gear. **POLYSTYRENE:** Polystyrene is a rigid ,brittle inexpensive plastic that has been used to make plastic model kits and similar knick – knocks .It would also be the basis for one of the most popular “foamed” plastics ,under the name styrene foam or Styrofoam. **NYLON:** Nylon are the very strong ,nylon can be machined and will take a fine thread .It is also slippery and can be used to make washers , spacers and bushes. Nylon was originally developed as a textile but is available in many vastly different properties .Engineering nylon grades are easy to machine with good resistance to biological attack . unfortunately nylons can absorb moisture from the atmosphere and can degrade in strong sunlight ,unless a stabilising chemical is added at the initial manufacture of the plastics . Nylons are easy to mould . Nylon are used for everything form clothes through to gears and bearings.		

			POLYETHYLENE:(LDPE&HDPE) Some times known as polythene , was discovered in 1933 by Reginald Gibson and Eric Fawcett at the British Industrial Giant Imperial Chemical Industries . The most common polymer in plastic is polyethylene , which is made from ethylene monomers (CH2=CH2). Today ,we call is low density polyethylene and high density polyethylene .Polyethylene are cheap flexible durable, and chemically resistance LDPE is used to make films and packaging materials ,while HDPE is used for containers ,plumbing and automotive fitting . **POLYPROPYLENE:** In 1953 Karl Ziegler and Giulio Natta , Working independently ,prepared polypropylene from propylene monomers CH2=CHCH3) and received the Nobel Prize in chemistry in 1963. The various forms of polypropylene have different melting points and hardness .Polypropylene is similar to its ancestor ,polyethylene and shares polyethylene's low cost ,but is much more robust .It is used in everything from the plastic bottles to carpets to plastic furniture ,and is very heavily. **POLYETHYLENE TERPHTHALATE :** John Rex Whinfield invented a new polymer in 1941 when he condensed ethylene		

			glycol with terephthalate acid . The condensate was polyethylene terephthalate . PET is a thermoplastic that can be drawn into fibres and films .It's the main plastic in zip lock food storage bags. **TEFLON:** Teflon was made in 1938 by DuPont .It's created by polymerization of tetrafluroethylene molecules. The polymers are stable ,heat resistant ,strong to many chemicals and has a nearly frictionless surface .Teflon is used in plumbing tape , cookware , tubing ,waterproof coatings ,films and bearings.		
3.	15mts	Explain the effects of plastics on human health.	**EFFECTS ON PLASTIC ON HEALTH:** Plastics are everywhere some are the eco friendly and appear to be very safe for kids . Most are the made from non-renewable petroleum ,much of which needs to be imported .Some plastic cause dangers pollution during manufacturing , and some contain chemicals suspected of causing harm-especially to the kids and the children. Turning to adverse effects of plastic on the human population , there Is a growing body of literature on potential health risks .A range of chemicals that are used in the manufacture of plastics are known to be toxic. The bio monitoring approach has demonstrated phthalates and biphenyl -A as well as other additives in plastics and their metabolites , are present in the human population. Some compounds leaching from the polystyrene food containers have been	Explaining	Listening

			proposed to interfere with hormone functions and are suspected of potential concern include alkyphenols. **PHTHALATE:** Phthalate are chemicals used in many plastic to make them soft or flexible ,ie. plasticizers. They are widely used in plastic products inthr food and construction industries ,they are used extensively in beauty products ,pesticides ,wood finishes ,insect repellents, solvents and lubricant's. They are a number of phthalate with different through often overlapping health effects. Scientists have been able to measure phthalate level in human tissues for just a few years ,studies have shown that most Americans have phthalates in their urine and that all of us are exposed to phthalates from such ubiquitous sources as air , water and soil as well as from foods. People who undergo medical procedure are exposed to especially high levels since phthalate can leach out of plastic medical supplies.Infants and children's are found to have higher levels than the adults . **Premature breast development:** Young girls are highest known incidence of premature breast development in the world . Phthalate like DHEP that mimic the oestrogen levels could be the cause of premature development of breast.		

			Asthma: Rates of asthma have been rising over recent decades, phthalates found in vapour from in indoor air and in house dust might be an important factor . **Pregnancy /miscarriage :** Decreased rates of pregnancy and higher rates of miscarriage have been found in a study of female exposed long –term to high levels of phthalates .Another study in women living near a plastics manufacture reported that pregnancy complication correlated with higher levels of phthalates in the women's urine. Just everyday breathing seems to be an important route of exposure to phthalate in pregnant women living in cities. **BISPHENOL-A:** Bisphenol -A is the chemical name for a building block of "polycarbonate" plastics. common polycarbonate products include 5-gallon water bottle's, baby bottles and plastic lacquer that lines many food cans. Concerns about the possible health effects of biphenol –A stem from its oestrogenic activity together with reports that it can might from the plastic into the liquids or foods stored inside. Children who are have higher levels of bisphenol-A a chemical previously used in many products for kids ,like baby bottle and plastic toys ,had a higher odds of obesity and		

			adverse levels of body fat ,according to new study from University of Michigan researchers. The levels of BPA found in children's urine and then measured body fat, waist circumference and cardiovascular and diabetes risk factor ,in a study publishes in paediatrics. The study found that higher odds of obesity ,defined as a BMI above the 95th percentile on Centres for Disease Control and Prevention growth higher levels of urinary BPA. The children's have abnormal levels of cholesterol , insulin or glucose level. The study reviewed that about 3,300 kids aged 6-18 years, and found that children with high BPA levels tend to have excessive amounts of body fat &unusually expanded waistlines. They may also caused the behavioural problem like Attention Deficit Hyperactivity Disorder &Autism.		
4.	15mts	Explain the effects of plastics on environment	**EFFECTS OF PLASTIC ON ENVIRONMENT :** Modernization and progress has had its shares of disadvantages and one of the main aspects of concerns the main pollution is causing to the earth –be it land, air and water. With increasing the global population and the rising demand food and other essential , there has been a rise in the amount of water being generated daily by each household. The group at risk from the unscientific disposal of solid waste include the	Explaining	Listening

			population in areas where there is no proper waste disposal method , especially the children ,waste workers, and workers in facilities producing toxic and infectious materials In particular , organic waste poses a serious threats ,since they ferments, creating conditions favourable to the survival and growth of microbial pathogens . Direct handling of solid waste can result in various types of infectious and chronic disease with the waste workers and the rag pickers being the most vulnerable. Exposure to hazards waste can affect the human health , children being more vulnerable of these pollutants. Direct exposure can leads to disease through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Waste from the industries can also cause serious health risks , other than this , co-disposal of industrial hazardous waste with municipal waste can expose people to chemical and radioactive hazards . Uncollected solid waste can also obstruct storm water runoff ,resulting in the forming of stagnant waste bodies that become the breading ground of disease.Waste dumped near water source also causes contamination of the water body or the ground water source .Direct dumping of untreated wasted in rivers sea and lakes results in the accumulation of toxic substances in the food chain through the plants and animals that feed on it. Disposal of hospital and other medical waste requires special attention since this can		

			create major health hazards .The waste like discarded syringe , bandages, are often disposed. The unhygienic use and disposal of plastics and its effects on human health . Most of the plastics are durable and degrade very slowly ;they vary in chemical bonds that make them so durable attend to make them resistant to most natural processes of degradation . Since 1950 ,one billion tons of plastic and some of that have been discarded material might persists for centuries or much longer. Serious environmental threats from plastic have been suggested in the light of the marine food chain along with many highly toxic chemical pollutant that accumulate in plastics. They also accumulate in larger fragmented pieces of plastic called nurdles . Estimated that 10% of modern waste was plastics , although estimate vary according to region –meanwhile, 50-80% of debris in mature areas is plastic. The effects of the plastic on global warming is mixed . the plastic are generally from the petroleum . I the plastic is incinerated , it increases carbon emissions if it is placed in the landfill , it becomes a carbon sinks although biodegradable plastic have caused methane emissions. Due to the lightness of plastic versus glass or metal ,plastic may reduce energy consumption . Industrial practices in plastic manufacture can lead to polluting effluents and the use of toxic intermediates , the exposure to which can be hazardous .Chlorinated plastic can		

			release harmful chemical into the surrounding soil, which can then seep into groundwater or other surrounding water sources and also the ecosystem . this can cause serious harm to the species that drink this water. Landfill areas are constantly piled high with many different types of plastics. In these landfill there are many microorganisms which spread up the biodegradable of plastics regarding, biodegradables plastics as they are broken down power full green gas that contributes significantly to global warming . **Ocean:** Nurdles are the plastic pellets (a type of micro plastic) that are shipped in to this form , after the in cargo ships to be used for the creation of plastic products A significant amount of nurdles are spilled in to ocean and it has been estimated that globally around 10% beach litter is nurdles . Plastic in ocean typically degrade within a year , but not entirely , and in the process toxic chemicals such as bisphenol-A and polystyrene can leach into water from some plastics. Polystyrene pieces and nurdles are the most common types of plastic pollution in oceans, and combined with plastic bags and food containers make up the majority of oceanic debris . **EFFECTS ON AN ANIMALS:** The plastic pollution has the potential to poison animals , which can been described		

<table>
<tr><td></td><td></td><td></td><td>as being highly determined to large marine mammals .
The plastic materials are ingested by the marine animals in vary among the animals .the animals typically starves ,because the accumulation of plastic that blocks the digestive tract.
The marine mammals are some times entangled the plastic items such as nets, water bottles ,which can harm or kill them.
The ingested of plastic materials can also affected the human by eating the marine animals like fish, crab.</td><td></td><td></td></tr>
<tr><td>5.</td><td>15mts</td><td>List down the recycling codes of plastic.</td><td>RECYCILNG CODES OF PLASTICS:
<table>
<tr><th>Recycling number</th><th>Images</th><th>Abbreviation</th><th>Polymer name</th><th>Uses</th><th>Recycling</th></tr>
<tr><td>1</td><td> 
</td><td>PETE or PET</td><td>Polyethylene terephthalate</td><td>Polyester fibres (Polar Fleece), thermoformed sheet, strapping, soft drink bottles, tote bags, furniture, carpet, panelling and (occasionally) new containers.</td><td>Picked up through most curb side recycling programs.</td></tr>
<tr><td>2</td><td> 
</td><td>HDPE</td><td>High-density polyethylene</td><td>Bottles, grocery bags, milk jugs, recycling bins, agricultural pipe, base cups, car stops, playground</td><td>Picked up through most curb side recycling programs,</td></tr>
</table></td><td>Explaining</td><td>Listening</td></tr>
</table>

							equipment, and plastic lumber	although some allow only those containers with necks.		
			3	 	PVC or V	Polyvinyl chloride	Pipe, fencing, shower curtains, lawn chairs, non-food bottles and children's toys.	Rarely recycled; accepted by some plastic lumber makers.		
			4	 	LDPE	Low-density polyethylene	Plastic bags, 6 pack rings, various containers, dispensing bottles, wash bottles, tubing, and various moulded laboratory equipment	LDPE is not often recycled through curb side programs, but some communities will accept it. Plastic shopping bags can be returned to many stores for recycling.		
			5		PP	Polypropylene	Auto parts, industrial fibres, food containers, and dishware	Number 5 plastics can be recycled through some curb side programs.		

										
			6		PS	Polystyrene	Desk accessories, cafeteria trays, plastic utensils, toys, video cassettes and cases, clamshell containers, packaging peanuts, and insulation board and other expanded polystyrene products (e.g., Styrofoam)	Number 6 plastics can be recycled through some curb side programs.		
			7		OTHER or O	Other plastics, such as acrylic, nylon, polycarbonate, and polylactic acid (bio plastic), and multilayer combinations of different plastics	Bottles, plastic lumber applications, Head light lenses, and safety shields/glasses.	Number 7 plastics have traditionally not been recycled, though some curb side programs now take them.		

6.	20mts	Enlist the preventive measures of plastic hazards.	**PLASTICS PRODUCTION ,USAGE, DISPOSAL AND WASTE MANAGEMENT SOLUTIONS:** Accumulation of plastic debris in the environment and the associated consequences are largely avoidable .Considerable immediate reductions in the quantity of waste entering in to natural environment ,as opposed to landfill , could be achieved by waste disposal and material management. Perhaps increasing the capacity to recycle will help to reverse this trend such that we start to regard end of life materials as valuable feedstock for new production rather than waste . Measures to reduce production of plastic by avoid to use and reduce to use of plastic products from oil here an example showing how small changes in product packaging required by 70% reusable plastic packing creates have reduced the packaging consumption of the same retailer by an estimated 30,000 tons per annum. From the waste management perspective the three 'R' s Reduce , Reuse ,and Recycle and they show to be effective we need to consider the three R's in combination with each other and together with the fourth 'R' energy Recovery . Indeed we also need to consider a fifth 'R' molecular Recover and Redesign. • Bring our own cloth bags to shopping. Ask our merchants to promote cloth	Explaining	Listening

			bags (change for plastic bags or provide incentive for cloth) • Encourage the bags made from the natural products such as corn starch and soy. • Buy drinks in the glass or aluminium containers 75% of aluminium are recycled only 36%of plastic are recycled. • A recent life cycle analysis calculated that use of 100% recycled PET rather than virgin PET to reduce plastic bottles could give a 27% o on CO2 emission. • Instead of plastic containers use such as stainless steel, aluminium ,glass for safe use. • Use drink and food storage container marked BPA –free . Look for the words "BPA –free" on the plastic bottles ,zippy cups and food containers for use.Use baby bottles made up of glass . • Avoid heating food and drink in plastic containers .Use ceramic utensils for microwave cooking. • Use the bio based plastic - Biobased plastics are plastics which are fully or partially made from renewable resources, often with the help of biotechnology, and encompass a range of different materials with different functionalities. Biobased plastics can be produced either in the plants themselves (for example		

			starch, cellulose), or through the polymerisation of plant-based sugars and oils (for example polylactic acid, polypropylene and polyethylene terephthalate). • Some plastics are fully biobased and may be biodegradable, such as starch and polyhydroxyalkanoates; some may be partially biobased and biodegradable such as polylactic acid and cellulose, whereas others may be partially biobased and non-biodegradable such as bio–polyethylene tetraphlate, bio-polypropylene and bio-polyethylene. Thus, whether a biobased plastic degrades or not is not a function of its biobased content, but a result of its unique physical properties. • It is estimated that between 85% of the plastics on the market today could be substituted by biobased plastics. Many biobased plastics could be processed using the same technologies as for fossil based plastics with some modifications to the processing parameters. • In 2011, 3.5 million tons of biobased polymers were produced worldwide, compared to 235 million tons of traditional, fossil based plastics. Biobased plastics have seen exponential growth rates in the past few years and projections for future growth are very positive, with some estimates suggesting that production may reach 12 million tons by 2020. • To date, the predominant market for biobased plastics has been in for		

			biodegradable applications, however, it is expected that non-biodegradable plastics or 'drop-ins' (such as polyethylene terephthalate, polypropylene and polyethylene) will become the predominant market for biobased plastics in the near future. • Biobased plastics contain renewable carbon. That is to say that the carbon contained within them has recently been taken from the atmosphere. So when this carbon is returned to the atmosphere at the end of the life of the bioplastics, it does not add to the amount of carbon within the atmosphere. • Some types of biobased plastics can be degraded through composting. This is a particular benefit for applications such as disposal cutlery and flexible food packaging where the plastics can be disposed of alongside food wastes. Biodegradable agricultural plastic mulches may also be simply ploughed into the field when needed, saving the need for collection and storage of plastics. • Other types of bioplastics, known as 'drop-in' bioplastics such as biobased polyethylene terephthalate are chemically identical to fossil based plastics and can be recycled in the same way as their conventional counterparts. At the end of their life, when recycling is no longer an option, these materials can be combusted to produce renewable energy and/or be used to make biofuels. • Biobased plastics can reduce energy consumption and CO2 emissions		

			compared to fossil based plastics. For example, some types of polylactic acid made from maize starch use up to 50% less oil, and releases 60% fewer Greenhouse Gases (GHG's) to the atmosphere than traditional oil based plastics for the same applications. • In the future, industry expects that less energy will be needed and GHG emissions will fall as the production and end of life processes are optimised and new feedstock and more sustainable energy sources become available. • Biotechnology can develop better crops for plastics production either through improving crop genomes to enhance desirable characteristics such as a high cellulose content, or through the genetic modification of crops to produce biobased plastics (such as polyhydroxyalkanoates) in the plant themselves. • Currently, most biobased plastics are derived from food-based sugars such as those derived from sugar cane or cereal crops. The use of non-food based biomass would be beneficial in overcoming any fears surrounding the use of food for industrial materials. Novel enzymes and microorganisms, developed through industrial biotechnology, can play a crucial role not only in maximising the efficiency of biomass breakdown and sugar release, but also the conversion of these sugars and carbon to biobased plastics. This, in turn, will make these plastics even more eco friendly.		

			• Finally, industrial biotechnology is a critical facilitating technology for the development of biobased plastics with novel functionalities, tailored to specific applications. • See the recycling code of plastic before buying the products. The symbol code are in the bottom of the plastic products. • It is use to reduce the risk minimize the hazards of plastic. The recycling codes are from the 1,2,3,4,5,6 & 7. • See the toys and things for children before buying . the international standard symbol on toys indicate a higher chemical safety standard symbol like , CE. • Safer plastic are # 1PET,#2HDPE,#4LDPE and #5 PP. • #1 PET is best known for its high recycling ,that #2HDPE another commonly recycled plastics. • #4 LDPE and #5PP although not as widely recycled are also god choices since as with #2HDPE ,most research study has not shown leaching any carcinogens. • Avoid soft vinyl toys and other vinyl products.		

CHAPTER -I

INTRODUCTION

CHAPTER- I

INTRODUCTION

" AN OUNCE OF PREVENTION IS

WORTH A POUND OF CURE "

- *Benjamin Franklin.*

BACKROUND OF THE STUDY

In modern era , Plastic is an inevitable substance, has become a part of every aspect of human living . It is one of the major toxic pollutants of our time. Plastics are widely used in the world because of their light weight ,cheap ,easy process of manufacturing .durability .strength and availability in all forms. Chemical diversity, abundance and hazardousness are one of the major environmental challenges of today. On the contrary to biological diversity, chemical diversity can be problematic from an environmental point of view. There is not sufficient knowledge to provide protection for human health and the environment against all these chemicals, which according to the European Inventory of Existing Commercial Chemical Substances (EINECS).

Plastics are typically polymers of high molecular weight, Polyethylene, Polyvinylchloride , Polystyrene are largely used in the manufacture of plastics, and may contain other substances like Bisphenol-A , Phethelets to improve the performance and reduce costs.

Bisphenol A (BPA) is an industrial chemical that has been present in many hard plastic bottles and metal-based food and beverage cans since the 1960s. Bisphenol A (BPA) is the molecular building block for Polycarbonate.

plastics and epoxy resins. U.S. Production of BPA grew rapidly from 16 million Pounds in 1991 to about 2.3 billion pounds in 2004,Making it one of the most produced chemicals in the World .

Infants are potentially sensitive population for BPA because their neurological and endocrine systems are developing; and their hepatic system for detoxification and elimination of such substances as BPA may be immature**. FDA** is supporting the industry's actions to stop producing BPA-containing bottles and infant feeding cups for the U.S market. FDA understands that the major manufacturers of these products have stopped selling new BPA-containing bottles and infant feeding cups for the U.S. market. Glass and polypropylene bottles and plastic disposable "bag" liners have long been alternatives to polycarbonate nursing bottles.

Phthalates 234 are "plasticizers" used to produce diverse products, including food and beverage packaging materials, and adhesives. Phthalates are additives that give plastics like polyvinyl chloride (PVC) properties such as flexibility and stress resistance.

NEED FOR THE STUDY

"Awareness is like the sun .

When it shines on the thing ,

They are transformed"

- *Thich Nhat Hanh*

Plastic have produced every day life, usage of plastic increased and annual production is likely 300 million tonnes by 2010. However ,concerns about usage and disposal are divers include accumulation of plastic in the landfill and in the natural habitats , physical problem for wildlife resulting from ingestion or entanglement of plastic , the leaching of chemicals from plastic

products and the potential for plastics to transfer chemicals to wildlife and humans.

The Times of India (2013) reported that **Central Pollution Control Board** informed it that India generates 56 lakh tonnes of plastic waste annually, with Chennai 429.4 tonnes per day,

Table – 1.1 Represents the statistical data of plastic waste generated in different states in India.

STATE	PLASTIC WASTE / PER DAY / TONNES
Delhi	689.4
Chennai	429.4
Kolkata	425.7
Mumbai	408.3

Plastics constitute a large material group with a global annual production that has doubled in 15 years (245 million tonnes in 2008). Plastics are present everywhere in society and the environment, especially the marine environment, where large amounts of plastic waste accumulate.

With respect to the health effects, the plasticizers leaches in to the food products they are major concerns in the health effects among the children and adult. **The National Toxicology Program at the National Institutes of Health and FDA** have concerns about the potential effects of BPA on the brain, behaviour, and prostate gland in foetuses , infants and young children. The new estimate of average dietary exposure, is 0.2-0.4 micrograms/kg-bw/day for infants and 0.1-0.2 micrograms/kg-bw/day for children and adults.

Donna Eng,M.D., C.S.Mott Children's Hospital, defined as a BMI above the 95th percentile on Centres for Disease Control and Prevention growth

curves ,was associated with the higher levels of urinary BPA .Children with higher levels of BPA also were more likely to have an abnormal waist circumference –to- height ratio.

Sakthivel .S et al ., (2015) stated that a few earlier studies have associated exposure to endocrine-disrupting chemicals (EDCs) with childhood obesity. There is limited information, however, on exposure to EDCs and childhood obesity in India. In this study, urinary levels of 26 EDCs were determined in 49 obese and 27 non-obese Indian children. Urinary concentrations of several EDCs were higher in Indian children than the concentrations reported for children in the USA and China.

Michels—who also is associate professor of gynaecology, obstetrics, and reproductive biology at **Harvard Medical School, Brigham and Women's Hospital**—and her colleagues had followed 77 Harvard College students over a two-week period. The students drank cold beverages from stainless steel bottles one week and from polycarbonate bottles the other week. Urine samples showed a 69 % increase in BPA levels during the polycarbonate week.

An **Environmental Health Perspectives** report published online October 6, drawing on data from 249 mothers and their children in Cincinnati, Ohio, associated prenatal BPA exposure with more aggressive and hyperactive behaviour in girls at age 2.

Annual Review of Public Health (2010),said that by 2010, the worldwide annual production of plastics will surpass 300 million tons. Plastics are indispensable materials in modern society, and many products manufactured from plastics are a boon to public health (e.g., disposable syringes, intravenous bags). However, plastics also pose health risks. Of principal concern are endocrine-disrupting properties, as triggered for example by bisphenol A and di-(2-ethylhexyl) phthalate (DEHP).

PROBLEM STATEMENT

A study to assess the effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the school children at selected rural schools, Thanjavur ,Dt.

OBJECTIVES

- To assess the knowledge and attitude regarding hazards of use of plastic products among the rural school children in experimental and control groups.
- To evaluate the effectiveness of Computer Assisted Instruction regarding the hazards of use of plastic products among the rural school children in experimental group.
- To compare the pre and post test levels of knowledge and attitude between the experimental and control group regarding hazards of use of plastic products among the rural school children.
- To correlate the post test scores of knowledge and attitude of rural school children regarding the hazards of use of plastic products among the rural school children in experimental and control groups.
- To determine the association between the pre test level of knowledge and attitude regarding the hazards of use of plastic products among the rural school children and their selected demographic variables in experimental and control groups.

HYPOTHESES

All the hypotheses were tested at $p< 0.05$ level of significance.

H_1:There will be a significant difference between the pre test and post test levels of knowledge and attitude regarding hazards of use of plastic products

among the rural school children in experimental and control groups.

H_2: There will be a significant difference in the levels of knowledge and attitude between the experimental and control groups regarding hazards of use of plastic products among the rural school children.

H_3:There will be a significant correlation between the knowledge and attitude regarding hazards of use of plastic products among the rural school children in experimental and control groups.

H_4: There will be a significant association between the pre test level of knowledge and attitude regarding hazards of use of plastic products use among the rural school children and their selected demographic variables in experimental and control group.

OPERATIONAL DEFINITION

EFFECTIVENESS

In this study, it refers to the extent to which the Computer Assisted Instruction influences in improving the knowledge and attitude regarding hazards of use of plastic products among the rural school children.

COMPUTER ASSISTED INSTRUCTION

In this study ,it refers to the planned teaching strategies regarding the hazards of use of plastic products with the help of computer to educate the rural school children .

KNOWLEDGE

In this study ,it refers to the information acquired by the rural school children about the hazards of plastic products use which was measured by using semi structured self-administered questionnaire.

ATTITUDE

In this study ,it refers to the perception & belief towards the hazards of use of plastic products among the rural school children which was measured using Likert scale.

SCHOOL CHILDREN

In this study ,it refers to the children who were studying in eighth standard in the schools.

RURAL SCHOOL

In this study ,it refers to the schools located in a geographic area that was at least 5 kms far away from the city.

HAZARDS OF USE OF PLASTIC PRODUCTS

In this study ,it refers It refers to the ill effects caused by the usage of plastic items which affect the environment and health of the human beings especially children and resulting in many problems such as water pollution ,soil pollution ,acute respiratory disease, poor immune response, precocious puberty ,infertility, obesity etc.

ASSUMPTIONS

- The use of plastic items may cause ill effects to environment and human health.
- The rural school children may not aware of hazards of plastic products usage.
- The computer assisted instruction will help to improve the knowledge and positive attitude regarding hazards of use of plastic products among the rural school children.

DELIMITATIONS

- The study was limited to rural school children between the age group of 13- 15 years.
- The data collection period was limited to 6 weeks .

PROJECTED OUTCOME:

- The computer assisted instruction may help to minimize the use of plastic items by the rural school children to prevent its hazards.
- The computer assisted instruction will help to improve the knowledge and positive attitude regarding hazards of use of plastic products among the rural school children.

CHAPTER – II

REVIEW OF LITERATURE

CHAPTER –II

REVIEW OF LITERATURE

A literature review is a text written by someone to consider the critical points of current knowledge including substantive findings, as well as theoretical and methodological contribution to a particular topic . Review of literature is the reading and organizing of previously written materials relevant to the specific problems to be investigated ; frame work and methods appropriate to perform the study.

PART I – Theoretical Frame Work.

Section –A : Theoretical review.

Section –B : Empirical review.

(i) Reviews related to hazards of plastic use to human health.

(ii) Reviews related to hazards of plastics to environment.

PART II – Conceptual Frame Work.

PART –I THEORETICAL FRAME WORK.

SECTION –A : THEORETICAL REVIEW.

PLASTIC AN OVERVIEW

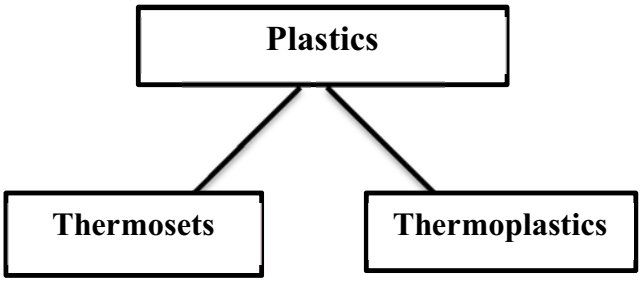
The word plastic derives from the Greek word (plasticos) means fit for moulding and (plastos) meaning moulded. It refers to their malleability or plasticity during manufacture that allow them to be cast , pressed or extruded into on enormous Variety of shapes plats , tubes, bottles ,boxes and much more.

Plastic are typically polymers of high molecule weight , and may contain other substances to improve the performance and reduce costs. Plastics takes more time to degraded, they may also pollute the environment and affect our health.

HISTORY OF PLASTICS

The first human made plastic was invented by Alexander Parkes in 1855 . He called this plastic parkesine later called celluloid . the development of plastics has come from the use of natural plastic materials (e.g chewing gum) to the use of chemically modified natural materials (e.g rubber) and finally to c completely synthetic molecules (e.g, polyvinyl chloride.) make up the polymers backbone and side chain .

TYPES OF PLASTICS



THERMOPLASTIC : Thermoplastics will soften and melts if enough heat is applied . (eg, Polyethylene, polystyrene)

THERMOSETS : Thermosets do not soften or melt no matter how much heat is applied. (eg, Polyester, Amino ,Epoxies , Phenolic, Polyimides, Polyurethane, silicone.

THERMOSET PLASTIC TYPES

ALKYDS: Alkyds are chemically modified alkyd resins are the condensation products of poly basic acids and Polyhydric alcohols. They are also oil-modified polyesters because of the presence of vegetable or marine oil or other fatty acids. They are used in the architectural coating ,automotive under body and under- hood coting ,coil coatings , drum, and metal container coating ,electrical industry ,paints.

UREA FORMALDEHYDE &MELAMINE FORMALDEHYDE / AMINO: Urea formaldehyde are strong ,glossy and durable. They are high mechanical strength ,fire, heat resistance ideal numerous industrial and household application .

EPOXIES: Epoxy resins are low molecular weight polymers or higher molecular weight . The application for epoxy based materials are extensive and include coatings, adhesives, electrical insulating paints and coating.

PHENOLICS: The phenolic are combined formaldehyde and phenol .The material called Bakelite . They are water and solvent resistant , could be used as electrical insulator , electronics and telephones ,radios ,records.

PLOYMIDES: Polyimides are the macromolecule with repeating units of linked by amino bonds when compared to most other organic or polymeric exceptional combination of thermal stability, mechanical toughness chemical resistance used in aircraft parts , wear ships, thrust washers .

POLYURETHENE : They are durable elastomers and high performance adhesives and sealants ,fibres, seats , gaskets also called as urethanes.

SILICONE : Silicone are polymers that include any inert ,synthetic compound made up of reparative units of Silicones. They are typically heat 2resistance and rubber-like and are used in sealants ,adhesives, lubricants medicine cooking utensils and thermal and electrical insulation.

THERMOPLASTICS

POLYVINYL CHLORIDE(PVC): PVC has side chains incorporating chlorine atoms, which form strong bonds . PVC can also be softened with chemical processing ,and in this form it is now used for shrink –wrap , food packaging and rain gear.

POLYSTYRENE: Polystyrene is a rigid ,brittle inexpensive plastic that has been used to make plastic model kits and similar knick – knocks .It would

also be the basis for one of the most popular “foamed” plastics ,under the name styrene foam or Styrofoam.

NYLON : Nylon are the very strong ,nylon can be machined and will take a fine thread .It is also slippery and can be used to make washers , spacers and bushes. Nylons are easy to mould . Nylon are used for everything form clothes through to gears and bearings.

POLYETHYLENE:(LDPE&HDPE) Some times known as polythene , was discovered in 1933 by Reginald Gibson and Eric Fawcett at the British Industrial Giant Imperial Chemical Industries . The most common polymer in plastic is polyethylene , which is made from ethylene monomers (CH2=CH2).Today ,we call is low density polyethylene and high density polyethylene . Polyethylene are cheap flexible durable, and chemically resistance LDPE is used to make films and packaging materials ,while HDPE is used for containers ,plumbing and automotive fitting .

POLYPROPYLENE : In 1953 Karl Ziegler and Giulio Natta , Working independently ,prepared polypropylene from propylene monomers CH2=CHCH3) and received the Nobel Prize in chemistry in 1963. The various forms of polypropylene have different melting points and hardness. Polypropylene is similar to its ancestor ,polyethylene and shares polyethylene’s low cost ,but is much more robust .It is used in everything from the plastic bottles to carpets to plastic furniture ,and is very heavily.

POLYETHYLENE TERPHTHALATE : John Rex Whinfield invented a new polymer in 1941 when he condensed ethylene glycol with terephthalate acid . The condensate was polyethylene terephthalate . PET is a thermoplastic that can be drawn into fibres and films .It’s the main plastic in zip lock food storage bags.

TEFLON: Teflon was made in 1938 by DuPont .It’s created by polymerization of tetrafluroethylene molecules. The polymers are stable ,heat

resistant ,strong to many chemicals and has a nearly frictionless surface .Teflon is used in plumbing tape , cookware , tubing ,waterproof coatings ,films and bearings.

SECTION –B : EMPIRICAL REVIEW.

(i) Reviews Related To Plastic Hazards To Human Health

Garcia. E, Hurley .S, Nelson DO, Hertz A and Reynolds P., (2015) , studied the population of 1,12,378 California Teachers Study participants included 5,676 women diagnosed with invasive breast cancer. Increased risk for several compounds, including acrylamide, carbon tetrachloride, propylene oxide and vinyl chloride, but after adjustment for multiple comparisons, only results for propylene oxide and vinyl chloride remained statistically significant.

Josyula. S, Rothman. N, Lin .J, et al .,(2015) , stated that Household Air Pollution (HAP) from solid fuel combustion contributes to 2.6% of the global burden of disease. HAP emissions are an established lung carcinogen; however, associations with other cancer sites have not been fully explored. We conducted a meta-analysis of 18 case-control studies found that HAP was associated with cervical neo aplasia (OR = 6.46; 95% CI =3.12-13.36; 4 studies); oral (OR = 2.44; 95% CI = 1.87-3.19; 4 studies; 1000 cases/3450 controls); nasopharyngeal (OR = 1.80; 95% CI = 1.42-2.29; 6 studies; 2231 cases/2160 controls); pharyngeal (OR = 3.56; 95% CI = 2.22-5.70; 4 studies; 1036 cases/3746 controls); and laryngeal (OR = 2.35; 95% CI = 1.72- 3.21; 5 studies; 1416 cases/4514 controls) cancers. results suggest that the carcinogenic effect of HAP observed for lung cancer may extend to other cancers, including those of the cervix and the upper aero-digestive tract.

MR.Mangessh,V.Jabade, Mr.Ameym and Khande,(2015), conducted the sudy to assess the knoledge among the students in high school .the finding showed that the significant association between the knowledge and demographic variabl

Bittner. GD, Yang. CZ and Stoner MA, (2014), stated that many BPA-free PC- replacement products still leached chemicals having significant levels of EA, as did BPA-containing PC counterparts they were meant to repla. That is, BPA-free did not mean EA-free. However, this study also showed that some PC-replacement products did not leach chemicals having significant levels of EA , that may have potential adverse effects on our health or the health of future generations **.**

Bhandari R, Xiao J, and Shankar A, (2013), examined the association between urinary BPA and obesity in children aged 6-18 years from the National Health and Nutrition Examination Survey (2003-2008). The primary exposure was urinary BPA and the outcome was obesity, defined as the ≥ 95th percentile of body mass index specific for age and sex. We found a positive association between increasing levels of urinary BPA and obesity, independent of age, sex, race/ethnicity, education, physical activity, serum cotinine, and urinary creatinine.

Dennis Thompson, Health Day News (2013), stated that insulin resistance and urinary levels of phthalate in 766 kids aged 12-19 .about 3,300 kids aged 6-18 ,and found that children with high BPA levels tend to have excessive amounts of body fat and unusually expanded waistlines.

Frederiksen H, Nielsen JK, Mørck TA, et al ., (2013) , studied first morning urine samples were collected from 6 to 11 years Danish children and their mothers. Children were significantly higher exposed to bisphenol A and some of the phthalates than their mothers, whereas mothers were higher exposed to compounds related to cosmetics and personal care products such as parabens .

Jhonson .C, Harley. K.G, Gunier. R.B, et al.,(2013), stated that Prenatal urinary BPA concentrations were associated with increased internalizing problems in boys, including anxiety and depression, at age 7. Childhood urinary BPA concentrations were associated with increased externalizing behaviours, including conduct problems, in girls at age 7 and

increased internalizing behaviours and inattention and hyperactivity behaviours in boys and girls at age 7, showed associations of early life BPA exposure with behaviour problems, including anxiety, depression, and hyperactivity in children.

R.K. Srivastava and Sushila Gorara, (2013) ,stated that the bisphenol – A changes in the insulin resistance, reproduction system ,cardiovascular function and brain function .BPA behaves as an oestrogen receptor agonist and mimics the oestrogen hormone.

Soliman .A.S, Kim J.H, Rozek L.S, et al ., (2013) , tested the urinary concentrations of total (free plus conjugated) species of BPA in spot samples were quantified for 60 girl aged 10 to 13. CpG methylation varied widely among girls, and higher urinary BPA concentrations were generally associated with less genomic methylation.

Stephanie L,Wright A,Richard C., (2013),stated that the plastic debris are the micro plastic and potentially also the nano - scale , are widespread in the environment . Micro plastic have accumulated in oceans and sediments worldwide in recent years , with maximum concentration reaching 100,000 particles m^3 .

Vandenberg LN, Hunt PA, Myers JP et al., (2013),stated that human exposure to bisphenol A (BPA), a synthetic oestrogen found in numerous consumer products, is widespread. However, scientific knowledge about the sources and routes of exposure remains incomplete. Although human bio monitoring studies report small amounts of bioactive BPA in the blood of most subjects, toxic kinetic models suggest that circulating levels should be undetectable. The results concluded that consistent with the large number of hazards and adverse effects identified in laboratory animals exposed to low doses of BPA.

Losa-Ward S.M, Todd K.L, McCaffrey K.A ,et al ., (2012) , stated that hypothalamic neurons, which produce the kisspeptin family of peptide

hormones (Kp), are critical for initiating puberty and maintaining oestrous cyclist by stimulating gonadotropin-releasing hormone (GnRH) release. Conversely, RFamide-related peptide-3 (RFRP3) neurons inhibit GnRH activity. It has previously been shown that neonatal exposure to bisphenol A (BPA) can alter the timing of female pubertal onset and induce irregular oestrous cycles or premature anoestrus.

Nelson J.W, Scammell M.K, Hatch E.E et al., (2012) , examined the association between the urinary concentrations of BPA, serum concentrations of four polyfluoroalkyl chemicals, and multiple measures of socioeconomic position.BPA concentrations were higher in people who reported very low food security and received emergency food assistance than in those who did not. This association was particularly strong in children: 6-11 year-olds whose families received emergency food had BPA levels 54% higher (95% CI, 13 to 112%) than children of families who did not.

Taskeen A, Naeem I and Atif M ., (2012) ,stated that a total of 100 individuals were selected for study according to the following five age groups: 5-10, 11-20, 21-30, 31-40 and 41-50 years to assess the BPA contents in blood and to assess the risk of cancer. Results concluded that bisphenol A contents found in blood samples of all age groups ranged from 1.53-3.98 (mean = 2.94, SD = 0.9). P-values, for the exposed people and those having a history of cancer, were < 0.05 showing a significant relationship between BPA and cancer The United States Environmental Protection Agency (US EPA) has established a reference dose of 50 microgram/L. Odd ratios and relative risk for smoking habit were < 1 while for all others they were > 1.

Delilah Lithner, Åke Larsson and Goran Dave, (2011), stated that Plastics constitute a large material group with a global annual production that has doubled in 15 years (245 million tonnes in 2008). Plastics are present everywhere in society and the environment, especially the marine environment, where large amounts of plastic waste accumulate. He identified hazardous substances used in polymer production for which the risks should be evaluated

for decisions on the need for risk reduction measures, substitution, or even phase out.

Neeti Rustagi ,S.K. Pradhan and Ritesh Singh,(2011),states that plastics proves their injurious nature towards human health in many direct or indirect ways. Phthalates mainly used as plasticizers in Poly Vinyl Chloride (PVC). including extensive use in toys and other children's products . Phthalates with a variety of adverse outcomes, including increased adiposity and insulin resistance, decreased anogenital distance in male infants, decreased the sex hormone level and other consequences for the human reproductive system, both for females and males, Infants and children may be especially vulnerable to the toxic effects of phthalates given their increased dosage per unit body surface area, immature metabolic system capability and developing endocrine and reproductive system.

Cheryl Erler and Julie Novak ,(2010), stated that BPA is a chemical used extensively to manufacture commonly used plastics and epoxy resins liners for food and beverage can, has been shown to exert endocrine – disrupting effects and result in behaviour changes ,altered growth and early secondary sexual maturation.

Rolf U. Halden , (2010) , stated that plastics are indispensable materials in the modern society , and many products manufactured from the plastic are a boon to public health. However ,plastics also poses health risks .Of principal concerns are endocrine –disrupting properties , as triggered for examples by bisphenol –A and di-2- ethylhexylphthalate .

Bridget M Kuehn, (2009), stated that the melamine sickened and killed pets revealed that the chemical could be harmful under certain circumstances .Since then , more than 50,000 Chinese children have been admitted in the hospitals, and at least 6 died.

Jessica A.Knoblauch ,The Environmental Health News,(2009) ,stated that chemicals added to plastic are absorbed by human bodies .Some of these

compounds have been found to alter hormones or have other potential problems. Plastic debris ,laced with chemicals and often ingested by marine animals ,can injures or poison wildlife.

(ii) Reviews Related To Plastic Hazards To Environment

Alexannder G.J.Driedge ,Hans.A.Durr, Kristen Mitchell, et al ., (2015) , stated that plastic pollution by plastic debris in the Laurentian Great Lakes , it affects the open water shoreline ,typically more than 80% of anthropogenic litter along the shoreline of the Great Lakes is comprised of plastics. Sources of plastic debris where from the products used by the consumer, pellets from the plastic manufacturing industries.

Fauziah S.H, Liyana I.A, Agamuthu P,(2015), Studied marine debris have gained worldwide attention since many types of debris have found their way into the food chain of higher organisms. This study was conducted to quantify plastic debris buried in sand at selected beaches in Malaysia. A total of 2542 pieces (265.30 g m^{-2}) of small plastic debris were collected from all six beaches. This demonstrates that commitments and actions, such as practices of the 'reduce, reuse, recycle' (3R) approach, supporting public awareness programmes and beach clean-up activities, are essential in order to reduce and prevent plastic debris pollution.

Ramji K. Bhandari et al .,Journal of Scientific Reports (2015) , tested the aquatic vertebrates have the potential for ecological impacts . bisphenol –A and 17 alpha ethinylestradial are two ubiquitous estrogenic chemicals are presented in the area .Observation suggested that the exposure of these two chemicals led to significant reduction in the fertilization rate in offspring two generation later as well as reduction of embryo survival.

Hasanin Khachi , Helen Meynell and Anna Murphy , (2014), stated that the asthma it is estimated that more than 5.6 million people in the UK are currently diagnosed with asthma, of whom 1.1 million are children . The occupational exposure of plastic is one the cause for asthma.

Hoarau L, Ainley L, Jean C and Ciccione S, (2014) , stated marine debris, caused by anthropogenic pollution, is a major problem impacting marine wildlife worldwide. This study documents and quantifies the ingestion and defecation of debris by 74 loggerhead sea turtles, Caretta caretta , in the South-West Indian Ocean. Debris was found in 51.4% of gut or faecal samples of loggerheads by-catch from Reunion Island long liners. Anthropogenic debris was ubiquitous in our samples with plastics accounting for 96.2% of the total debris collected , results highlight the magnitude of this pollution of the marine environment.

Marcus Eriksen ,Laurent C.M. Lebreton, Henry S. Carson,et al ., (2014), estimated that at least 5.25 trillion plastic particles weighing 268,940 tons are currently floating at sea . In the Southern Hemisphere the Indian Ocean appears to have a greater particle count and weight than the South Atlantic and South Pacific oceans combined. The data showed the weight of plastic pollution globally was estimated to comprise 75.4% macro plastic, 11.4% meso plastic, and 10.6% and 2.6% in the two micro plastic size classes, respectively. Data suggest that a minimum of 233,400 tons of larger plastic items are afloat in the world's oceans compared to 35,540 tons of micro plastics.

Klein S, Worch E, Knepper T.P,(2010), Plastic debris is one of the most significant organic pollutants in the aquatic environment. Because of properties such as buoyancy and extreme durability, synthetic polymers are present in rivers, lakes, and oceans and accumulate in sediments all over the world. Analysis of the plastics by infrared spectroscopy showed a large abundance of polyethylene, polypropylene, and polystyrene, which covered more than 75% of all polymer types identified

PART –II CONCEPTUAL FRAMEWORK

KING'S GOAL ATTAINMENT THEORY

Conceptual framework is a basic structure that consists of certain abstract block which represents the observational the experimental and analytical / synthetically aspects of a process (or) system being conceived. The interconnection of these blocks completes the framework for certain expected outcomes. A conceptual framework is used in research to outline possible course of action (or) to present a preferred approach to an idea (or) thought. Nursing theory should provide the principles that underpin practice and help to generate further nursing knowledge.

The study is based on Imogene king's goal attainment theory (1997) which would be relevant for CAI regarding the hazards of use of plastic products. Imogene king's system is an open system. In this system human are in constant contact interaction with their environment.

Perception:

In this study the researcher perceives that most of the rural school children had inadequate knowledge and attitude regarding hazards of use of plastic products.

Judgment:

In this study the researcher judge that the CAI is effective in improving the knowledge and attitude regarding hazards of use of plastic products. It provides minimize the use of plastic products as well as prevent the plastic hazards.

Action:

In this study the researcher prepare the CAI is effective in improving the knowledge and attitude regarding hazards of use of plastic products.

Mutual goal setting:

In this study it is an activity that includes the children when appropriate in prioritizing the goal and in developing the plan of action to achieve those goals. Here this study both the researcher and children accept to undergone with the research study.

Reaction:

The researcher plans together and moves towards goal attainment. Here the researcher plan to teach the hazards of use of plastics after conducting the pre test to the experimental group.

Interaction:

The act of two or more persons in mutual presence and sequence of verbal and non-verbal behaviours that are directed towards goal. In this study the interaction includes pre test (for assessing the knowledge and attitude) than administration of CAI and post test to the samples of the experiment group and no intervention to the samples of the control group.

Transaction:

In this study the transaction includes post test on the assessment of knowledge and attitude regarding hazards of use of plastic products among the children. In this study the researcher and the subject came together for an interaction, a different set of perception to exchange. The researcher perceives the subject need to teaching the hazards of use of plastic products to minimize the plastic hazards among the rural school children. The researcher communicates the subjects by implementing the CAI regarding the hazards of use of plastic products between the subjects takes place. The goal is said to be achieved is an increased level of knowledge and attitude in experimental and control group.

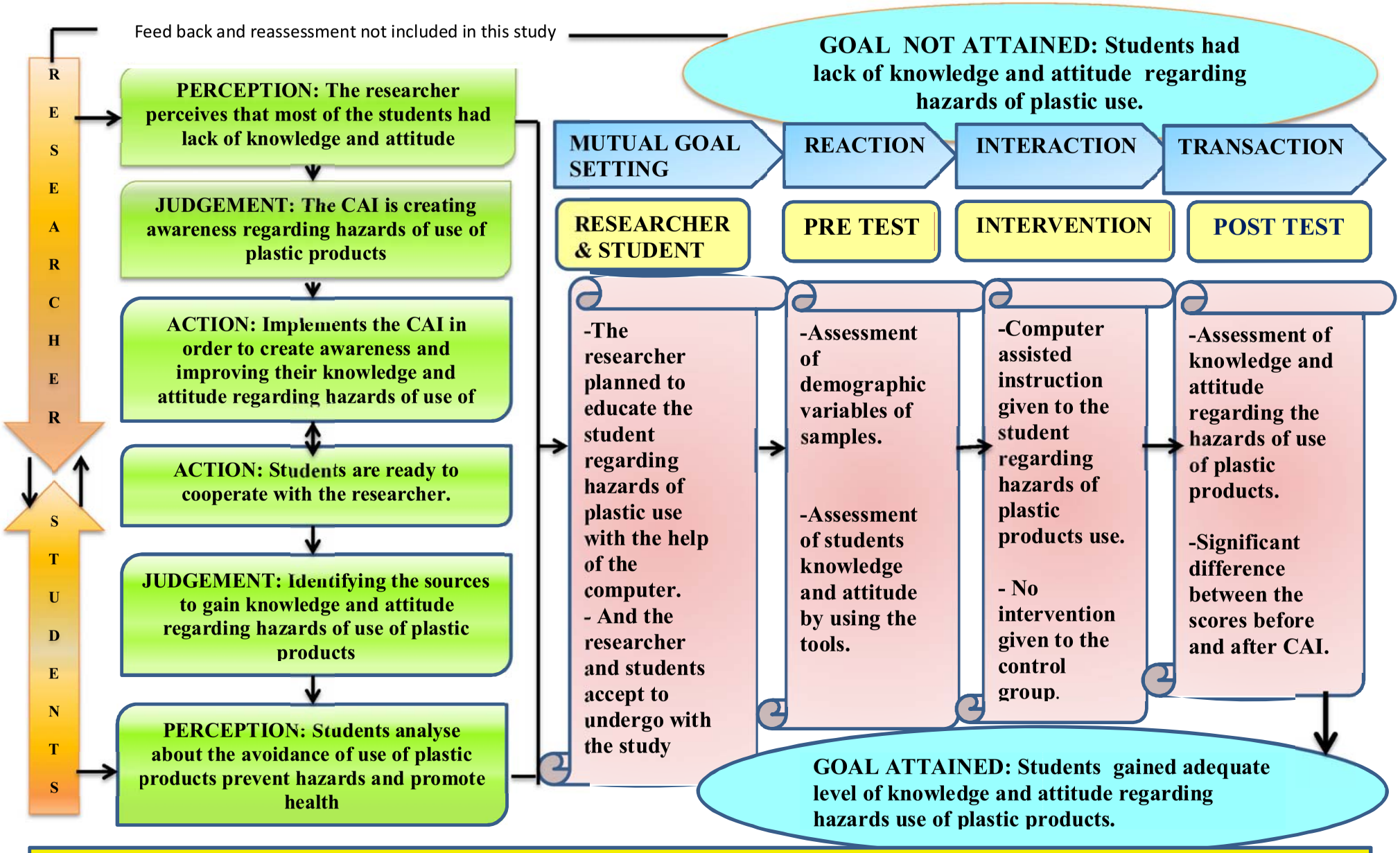
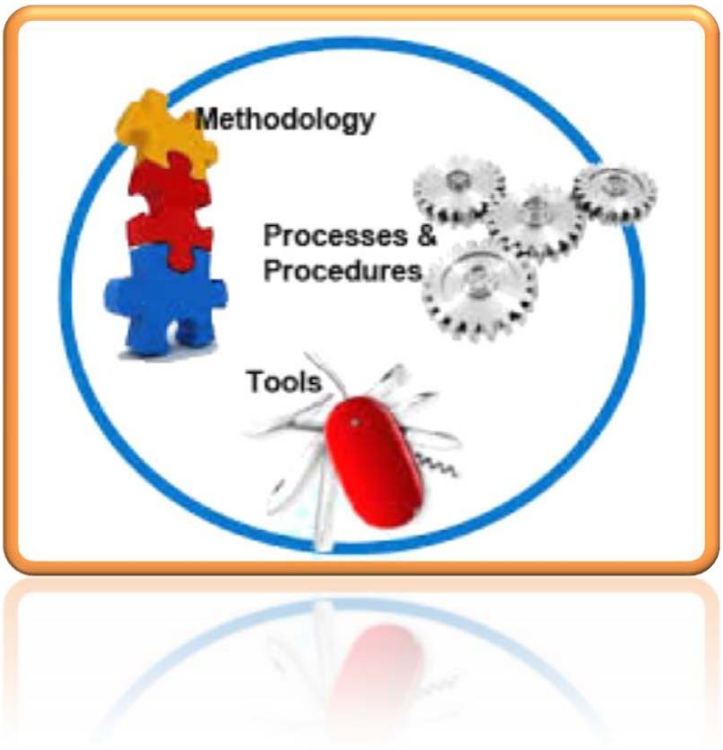


FIG-2.1 : Conceptual Frame work based on King's Goal Attainment Theory (1997) to evaluate the effectiveness of CAI regarding the hazards of use of plastic products among the rural school children.

CHAPTER - III



RESEARCH METHODOLOGY

CHAPTER-III

RESEARCH METHODOLOGY

Research methodology is a way to systematically solve the research problem. In this chapter the investigator discusses the Research approach, Research design, Variables, Setting, Population, Sample, Sample size, Sampling technique, Criteria for data collection, Description of the tool, Plan for data analysis and Protection of human rights.

RESEARCH APPROACH

Evaluative research approach was used in this study.

RESEARCH DESIGN

Quasi experimental design - Non equivalent pre test- post test control group design was used in this study.

E	**O_1**	**X**	**O_2**
C	**O_1**	**-**	**O_2**

E- experimental group. C –control group

O_1- pre test O_2 – post test

X- intervention(Computer Assisted Instruction regarding the hazards of use of plastic products)

VARIABLES

Independent variable: Computer Assisted Instruction regarding hazards of use of plastic products.

Dependent variables: Knowledge & attitude regarding hazards of use of plastic products.

Demographic variables: Age, Gender, Education of the father , Education of the mother, Monthly income of the family, Area of residence, Previous source of information.

SETTING

The study was conducted for experimental group at Government Higher Secondary School, Punnailnallur, Thanjavur,Dt, which was located 15kms away from the city, and for control group at Government Higher Secondary School,Aarchuthipattu ,Thanjavur ,Dt and Government Higher Secondary School,Urantharayankudikadu ,Thanjavur ,Dt which were located 30 kms away from the city.

POPULATION

The population of this study was the school children studying in Rural Schools, Thanjavur (dt).

SAMPLE

The sample of this study was the school children studying in eighth standard at Rural School ,Thanjavur(dt).

SAMPLE SIZE

The sample size comprised of 120 eighth standard school children who were studing in the selected rural schools ,Thanjavur ,Dt.

Experimental group : 60students

Control group : 60 students

SAMPLING TECHNIQUE

Non probability - convenient sampling technique was used in this study.

CRITERIA FOR SAMPLE SELECTION

INCLUSION CRITERIA

- The school children who were aged between 13&15 years.
- The school children who were studying in the rural schools .
- The rural school children who could understand, read and write Tamil & English.
- The rural school children who were available at that time of data collection.

EXCLUSION CRITERIA

- The school children who were not willing to participate in this study
- The school children who were sick at the time of study.

DATA COLLECTION TOOLS

Semi structured questionnaire will have III parts,

Part-I - Demographic variables.

Part-II- It consisted of self administered questionnaire used to assess the knowledge regarding hazards of use of plastic products.

Part-III- It consisted of 5 point Likert scale used to assess the attitude regarding hazards of use of plastic products.

REPORT OF THE PILOT STUDY

Pilot study was conducted to test the reliability, practicability, validity and feasibility of the tool. Pilot study was conducted for a period of 2 weeks. The investigator obtained a written consent from the authorities of Government High School, Puthur,(Experimental group) and Government High School, Kovilur (Control group). The investigator obtained the oral consent from the participants prior to the study. Non probability convenient sampling technique was used to select the samples. The pre test was conducted by using knowledge questionnaire to assess the knowledge and 5 point Likert scale to assess the attitude. The next day, CAI was provided to the (experiment group) and the post test was conducted after 7 days by using the same tools for both experimental and control groups. The result of the pilot study was analysed by the descriptive and inferential statistics and it showed the study was feasible to do. So the main study was proceeded.

RELIABILITY AND VALIDITY OF THE TOOL

The reliability and validity of the tool was established with Medical and Nursing experts. The tool was modified according to the suggestions and

recommendations of experts and the tool was finalized. The reliability of the tool was established by test-retest method ,experimental group r = 0.8 and control group r = 0.3 (Karl Pearson co-efficient Formula)

METHOD OF DATA COLLECTION

Written formal permission was obtained from the authorities of the schools. The investigator obtained the oral consent from the participants prior to the study. Non probability convenient sampling technique was used to select the samples. The investigator conducted the pre test by using the self administered knowledge questionnaire to assess the knowledge and 5 Point Likert scale to assess the attitude . The next day CAI was provided to the experimental group and the post test was conducted after 7 days by using same tools for both experimental &control groups to determine the knowledge and attitude of the subjects with the help of using the same questionnaire and 5 point Likert scale.

SCORING AND INTERPRETATION PROCEDURE

(A) SCORING OF THE TOOL

PART-I:

It consisted of 24 items related to knowledge regarding hazards of use of plastic products Each correct answers carries “1” mark and “0” mark for wrong answer.

$$\frac{\text{Obtained score}}{\text{Total score}} \times 100$$

TABLE 3.1 Represents the frequency & percentage for the levels of knowledge distribution.

LEVEL OF KNOWLEDGE	SCORE	PERCENTAGE
Inadequate knowledge	0 – 8	0 – 33 %
Moderately adequate knowledge	9 – 16	34 – 67%
Adequate knowledge	17 – 24	68 – 100%

PART-II

It consisted of 12 items related to attitude likert scale. Each item carries "1" (one) mark for correct answer "0" mark for wrong answer.

$$\frac{\text{Obtained score}}{\text{Total score}} \times 100$$

TABLE 3.2 Represents the percentage for the levels of practice score

LEVEL OF ATTITUDE	SCORE	PERCENTAGE
Inadequate attitude	0-20	0 - 33 %
Moderately attitude	21-40	34 – 67 %
Adequate attitude	41-60	68 – 100%

PLAN FOR DATA ANALYSIS

Collected data was tabulated and analysed by using descriptive and inferential statistical methods.

TABLE 3.3 Represents the plan for data analysis

S. NO	DATA ANALYSIS	METHODS	REMARKS
1.	Descriptive statistics	Percentage, Frequency distribution and Mean, standard Deviation	To describe the demographic variables of rural school children's knowledge and attitude in both experimental and control group.
		Correlation	To determine the relationship between the post test scores of knowledge and attitude of rural school children in both experimental and control group.
2.	Inferential statistics	Paired "t" Test	To assess the effectiveness of Computer Assisted Instruction regarding hazards of use of plastic products among the rural school children.
		Unpaired "t" test	To compare the knowledge and attitude of rural school children in both experimental and control group.
		Chi-square test	To find out the association between the knowledge and attitude of rural school children in both experimental and control groups with their selected demographic variables.

PROTECTION OF HUMAN SUBJECTS

The research proposal was approved by the dissertation committee prior to conduct the pilot study. The permission was obtained from the head of the institutional authorities. After the clear explanation about the study, oral consent was obtained from each participant before started the data collection. Assurance was provided to the subjects that the anonymity, confidentiality and subject privacy would be guarded.

CHAPTER -IV

DATA ANALYSIS

CHAPTER –IV

DATA ANALYSIS

This chapter deals with the description of sample characteristics , analysis and interpretation of data collected from the rural school children regarding hazards of use of plastic products.

This chapter represents the organization of data and interpretation of data by using the descriptive and inferential statistical methods .The data was collected and analysed as per the objectives of the study.

ORGANIZATION OF DATA

The data was organized and tabulated as follows.

SECTION : 1

Assessment of demographic variables of the rural school children regarding hazards of use of plastic products.

SECTION : 2

Assessment of pre test levels of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

SECTION : 3

Assessment of post test levels of attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

SECTION : 4

Comparison of pre test and post test levels of knowledge and attitude score regarding hazards of use of plastic products among the rural school

children in both experimental and control group.

SECTION : 5

Comparison of experimental and control group levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children.

SECTION : 6

Assessment of correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

SECTION : 7

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children with their age, gender, education of the father , education of the mother , monthly income of the family, previous source of information ,area of residence.

PRESENTATION OF DATA

SECTION : I

Assessment of demographic variables of the rural school children regarding hazards of use of plastic products.

TABLE: 4.1 Represents the frequency and percentage distribution of demographic variables of rural school children regarding hazards of use of plastic products in both experimental and control groups.

N=60(E)+60(C) =120

DEMOGRAPHIC VARIABLES	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	Percentage	Frequency	Percentage
Age in years				
a) 13 years	32	53.3%	33	55%
b) 14 years	25	41.6%	24	40%
c) 15 years	3	5.0%	3	5%
Gender				
a) Male	33	55%	33	55%
b) Female	27	45%	27	45%
Education Of The Father				
a) Illiterate	27	45%	31	51.6%
b) Primary	22	36.6%	22	36.6%
c) High school	11	18.3%	8	13.3%
d) Higher secondary	0	0%	0	0%
e) Diploma	0	0%	0	0%
f) Degree	0	0%	0	0%

Education Of The Mother				
a) Illiterate	34	56.6%	31	51.6%
b) Primary	25	41.6%	28	41.6%
c) High school	1	1.6%	1	1.6%
d) Higher secondary	0	0%	0	0%
e) Diploma	0	0%	0	0%
f) Degree.	0	0%	0	0%
Monthly Income Of The Family				
a) < Rs 5,000	30	50%	31	51.6%
b) Rs 5,001-10,000	30	50%	29	48.6%
c) > Rs10,001.	0	0%	0	0%
Area Of Residence				
a) Rural	39	65%	35	58.3%
b) Urban	0	0%	0	0%
c) Semi urban	21	35%	25	41.6%
Previous Source Of Information				
a) Health personnel	0	0%	0	0%
b) Friends	13	21.6%	15	25%
c) Relatives	0	0%	0	0%
d) Media	24	40%	23	38.6%
e) None of the above	23	38.3%	22	36.6%

TABLE : 4.1 represents the frequency and percentage distribution of demographic variables of rural school children regarding hazards of use of plastic products in both experimental and control groups.

From this table, it is implied that among the 60(100%) rural school children in the experimental group , 32(53.6%) students were 13 years old, 25 (41.6%) students were 14 years old and 3(5%) students were 15 years old in experimental group .Were as in the control group maximum of students 33(55%) were 13 years old, 24(40%) students were 14 years old and 3(5%) students were 15 years old in the control group.

Regarding the gender of the rural school children ,33(55%) of them were males,27(45%)of them were females in the experimental group .Where as in the control group 33(55%) of them were males,27(45%)of them were females.

Regarding the rural school children's education of the father 27(45%) were illiterate ,22(36.6%) were studied primary education ,11(18.3%) of them were passed high school education in the experimental group .Where as in the control group 31(51.6%) were illiterate , 22(36.6%) were studied primary education , 8(13.3%) of them were passed high school education.

Regarding the rural school children's education of the mother 34(56.6%) were illiterate ,25(41.6%) were studied primary education ,1(1.6%) of them were passed high school education in the experimental group .Where as in the control group 31(51.6%) were illiterate , 28(46.6%) were studied primary education and 1(1.6%) of them were passed their high school education.

Regarding the monthly income of the family 30(50%) of them were gained grossly about < Rs.5,000 and 30(50%) of them were gained grossly about Rs.5,001-10,000 in the experimental group . Where as in the control group 31(51.6%) of them were gained grossly about < Rs.5,000 and 29(48.6%) of them were gained grossly about Rs.5,001-10,000.

Regarding the area of residence, the rural school children, maximum of children 39(65%) were coming from rural area and 21(35%) of them were coming from the semi urban area in the experimental group .Where as in the

control group maximum of children 35(58.3%) were coming from rural area and 25 (41.6%) of them were coming from the semi urban area.

Regarding the previous source of information 13(21.6%) were gained knowledge from friends,24(40%) of them were gained from media and 23 (38.6%) of them were not getting any information in the experimental group .Where as in the control group 15(35%) were gained knowledge from friends , 23(38.6%) of them were gained from media and 22(36.6%) of them were not getting any information regarding the hazards of use of plastic products.

Figure 4.1 Represents the percentage distribution of age of the rural school children in experimental and control groups**.**

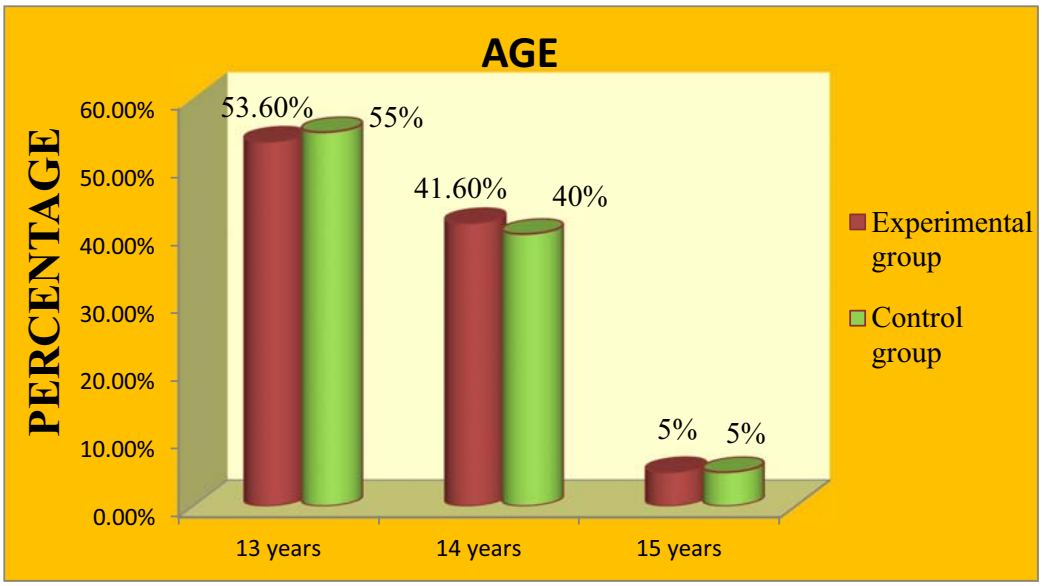


Figure 4.2 Represents the percentage distribution of gender of the rural school children in experimental and control groups.

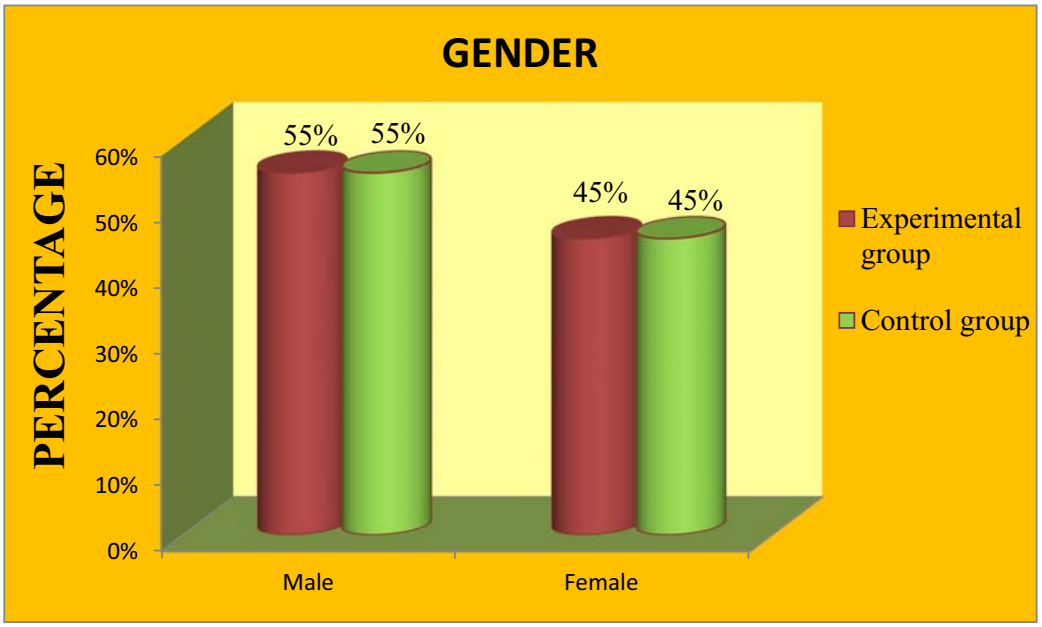


Figure 4.3 Represents the percentage distribution of education of the father of the rural school children in experimental and control groups.

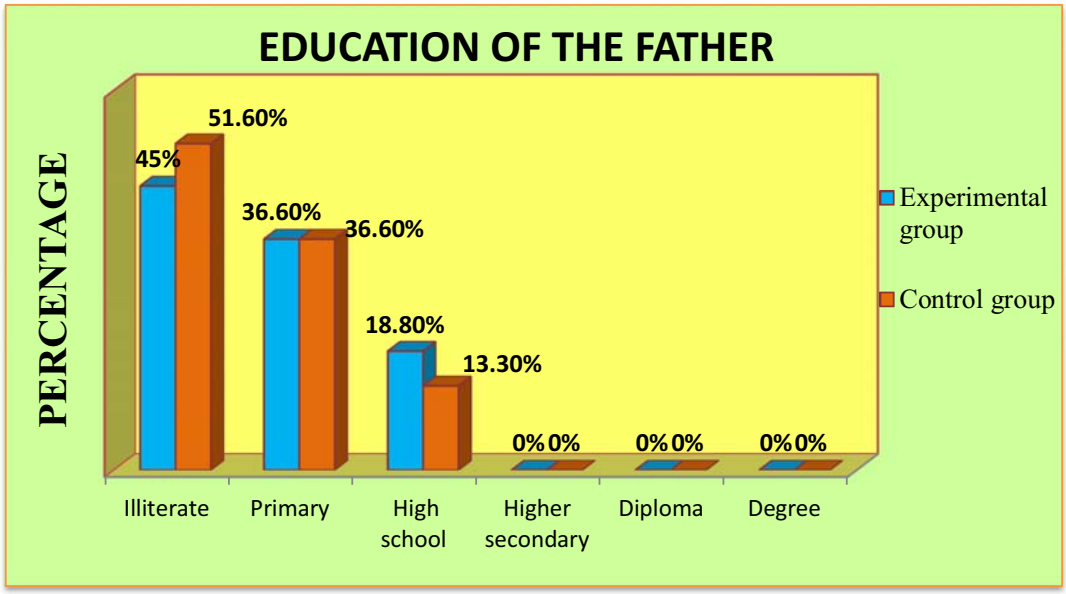


Figure 4.4 Represents the percentage distribution of education of the mother of the rural school children in experimental and control groups.

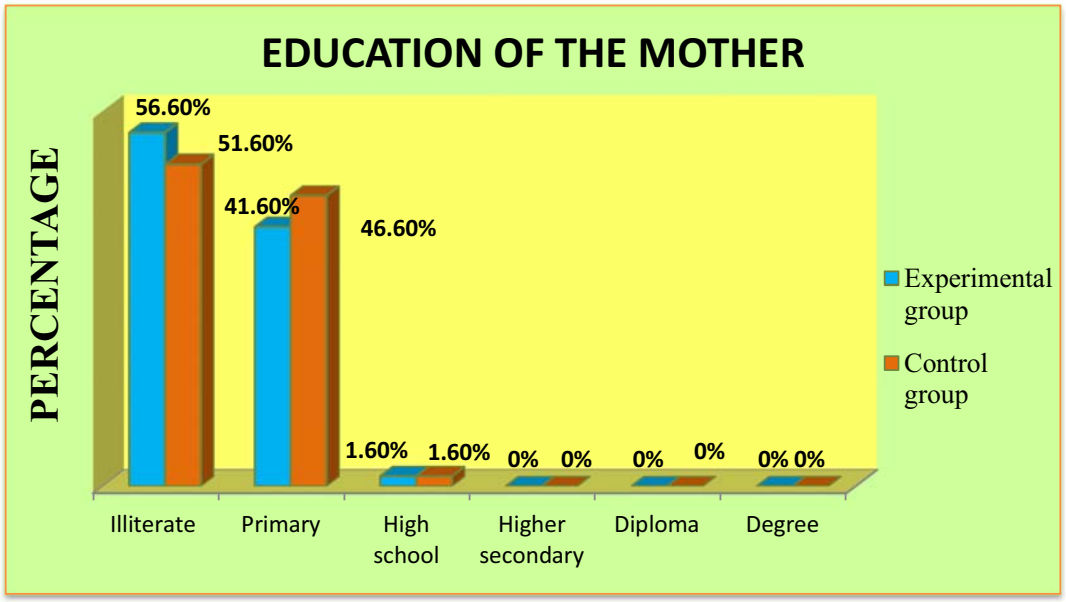


Figure 4.5 Represents the percentage distribution of monthly income of the family of the rural school children in experimental and control groups.

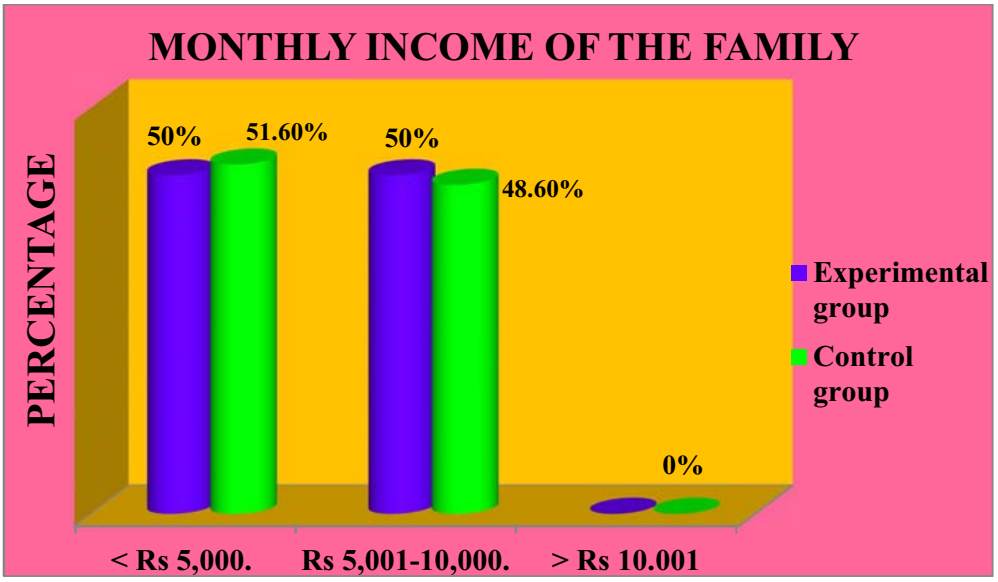


Figure 4.6 Represents the percentage distribution of area of residence the of rural school children in experimental and control group.

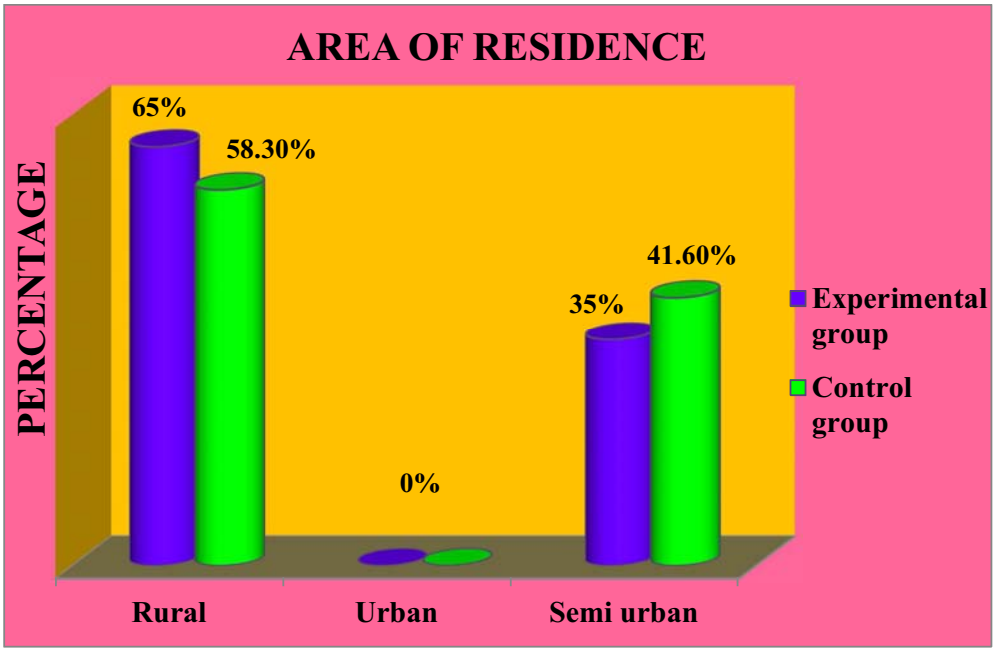
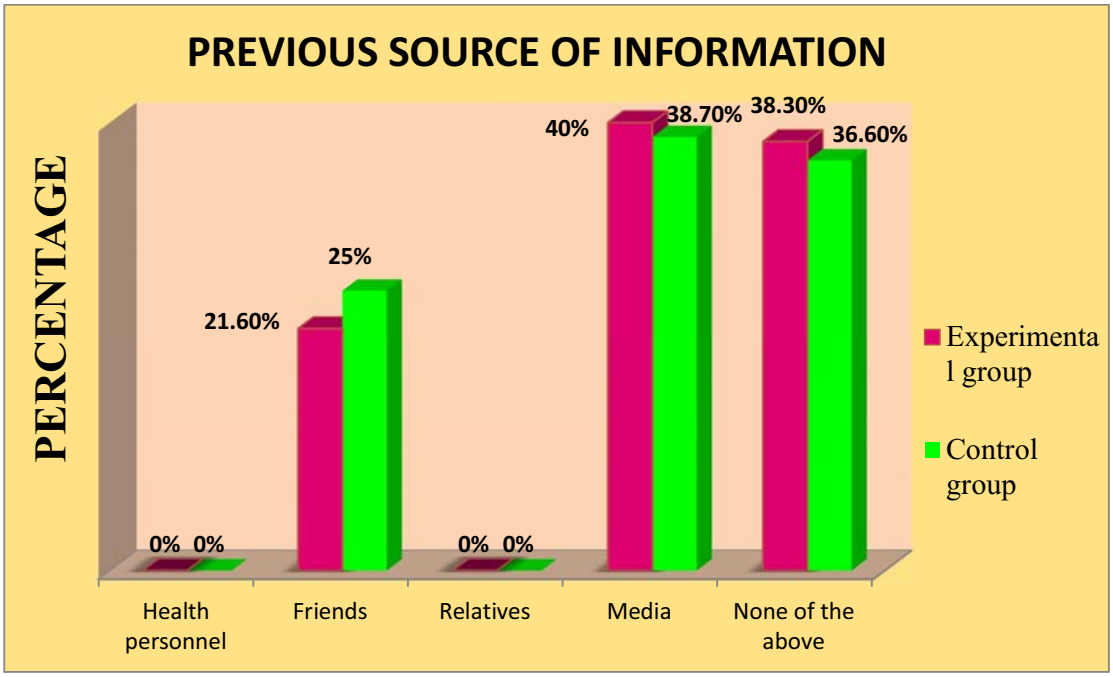


Figure 4.7 - Represents the percentage distribution of previous source of information of the of rural school children in experimental and control groups.



SECTION : 2

Assessment of pre test levels of knowledge and attitude regarding regarding hazards of use of plastic products among the rural school children.

TABLE : 4.2

Represents frequency and percentage distribution of pre test levels of knowledge regarding hazards of use of plastic products among the rural school children.

N=60(E)+60(C)=120

LEVELS OF KNOWLEDGE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	Percentage	Frequency	Percentage
Inadequate knowledge	41	68.33%	43	71.66%
Moderately adequate knowledge	19	31.66%	17	28.66%
Adequate knowledge	-	-	-	-

Table 4.2 Represents the Frequency and percentage distribution of pre test levels of knowledge regarding hazards of use of plastic products among the rural school children.

Assessment of pre test level of knowledge regarding the hazards of use of plastic revealed that 41(68.66%) of the student had inadequate knowledge and 19(31.66%) of the students had moderately adequate knowledge in experimental group. Where as in the control group 43(71.66%) of the student had inadequate knowledge and 17(28.66%) of the students had moderately adequate knowledge and none of them had adequate knowledge in both the experimental and control group.

TABLE : 4.3

Represents frequency and percentage distribution of pre test levels of attitude regarding hazards of use of plastic products among the rural school children.

N = 60 (E)+ 60(C) =120

LEVELS OF ATTITUDE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate attitude	44	73.33%	45	75%
Moderately adequate attitude	16	26.66%	15	25%
Adequate attitude	-	-	-	-

Table 4.3 Represents the Frequency and percentage distribution of pre test levels of attitude regarding hazards of use of plastic products among the rural school children.

Assessment of pre test level of attitude regarding the hazards of use of plastic products revealed that 44(73.33%) of the student had inadequate attitude and 16(26.66%) of the students had moderately adequate attitude in experimental group. Where as in the control group 45(75%) of the student had inadequate attitude and 15(25%) of the students had moderately adequate attitude and none of them had adequate attitude in both the experimental and control group.

SECTION : 3

Assessment of post test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children.

TABLE : 4.4

Represents the frequency and percentage distribution of post test levels of knowledge regarding hazards of use of plastic products among the rural school children.

N = 60 (E)+ 60(C) =120

LEVELS OF KNOWLEDGE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate knowledge	-	-	41	68.33%
Moderately adequate knowledge	18	30%	19	31.66%
Adequate knowledge	42	70%	-	-

Table 4.4 Represents the Frequency and percentage distribution of post test levels of knowledge regarding hazards of use of plastic products among the rural school children.

Assessment of post test level of knowledge regarding the hazards of use of plastic revealed that none of them had inadequate knowledge, 18(30%) of the students had moderately adequate knowledge and 42(70%) of the students had adequate knowledge in experimental group. Where as in the control group 41(68.33%) of the student had inadequate knowledge and 19 (31.66%) of the students had moderately adequate knowledge and none of them had adequate knowledge in the control group.

TABLE : 4.5

Represents frequency and percentage distribution of post test levels of attitude regarding hazards of use of plastic products among the rural school children.

N = 60 (E)+ 60(C) =120

LEVELS OF ATTITUDE	EXPERIMENTAL GROUP		CONTROL GROUP	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Inadequate attitude	-	-	43	71.66%
Moderately adequate attitude	21	35%	17	28.33%
Adequate attitude	39	65%	-	-

Table 4.5 Represents the Frequency and percentage distribution of post test levels of attitude regarding hazards of use of plastic products among the rural school children.

Assessment of post test level of attitude regarding the hazards of use of plastic products revealed that none of them had inadequate attitude, 21(35%) of the students had moderately adequate attitude and 39(65%) of the students had adequate knowledge in experimental group. Where as in the control group 43(71.66%) of the student had inadequate attitude and 17 (28.33%) of the students had moderately adequate attitude and none of them had adequate attitude in control group.

SECTION : 4

Comparison of pre and post test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

TABLE 4.6

Comparison of pre and post test levels of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

N = 60 (E)+ 60(C) =120

GROUP	PRE TEST		POST TEST		Paired "t" test value
	MEAN	SD	MEAN	SD	
Experimental group	8.58	2.88	19.06	3.39	t = 24.11*
Control group	9.18	3.44	8.50	2.77	t = 1.83

*significant

H0- There is no significant association between the pre test and post test levels of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

TABLE 4.6

Comparison of pre test and post test revealed that mean value 8.58 with standard deviation 2.88 of pre test has significant to the post test mean value 19.06 with standard deviation 3.39 and the 't' value CV = 24.11and TV = 2.0010 (CV > TV) which is significant at 0.05 level of experimental group.

Where as in the control group the analysis that mean value 9.18 with standard deviation 3.44 of pre test has significant to the post test mean value 8.50 with standard deviation 2.77 and the 't' value CV =

1.83 and TV = 2.0010 (CV > TV) which is not significant at 0.05 level for control group. It shows the given computer assisted instruction was very effective.

FIUGRE 4.8 Comparison of the pre test and post test knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

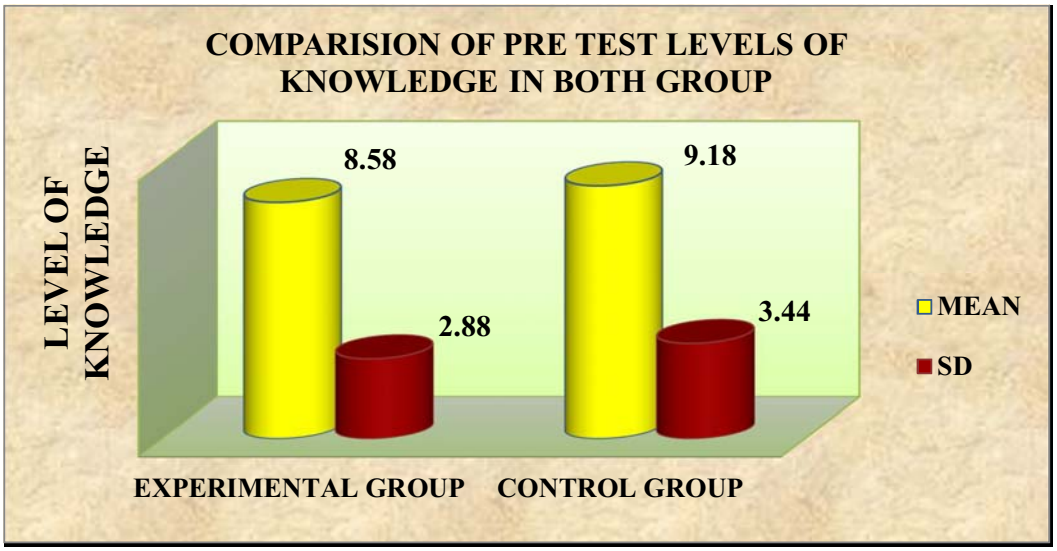


FIGURE 4.9 Comparison of the post test level of knowledge regarding hazards of use of plastic products among the rural school children in both experimental and control group.

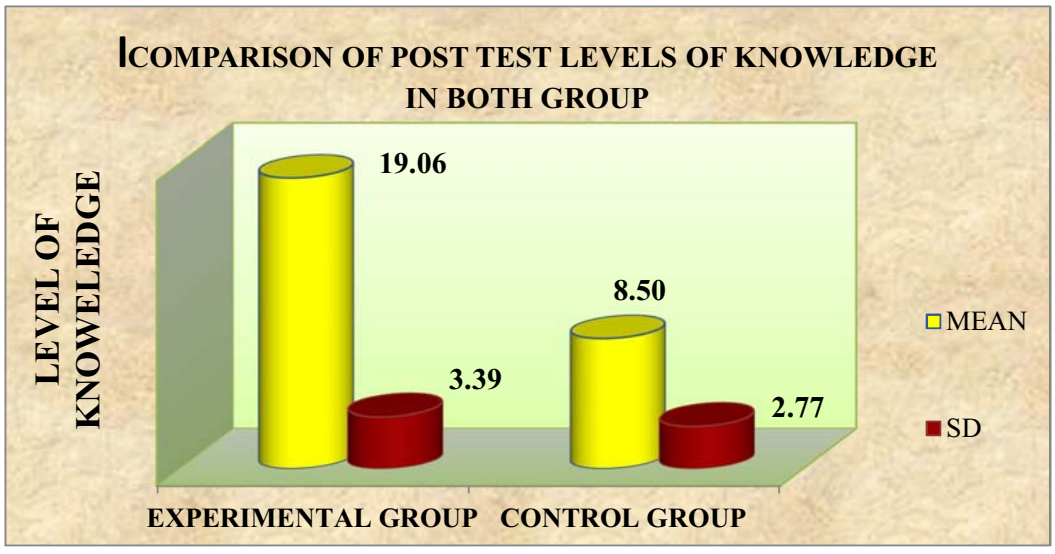


TABLE 4.7

Comparison of pre and post test levels of attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

N=60(E)+60(C)=120

GROUP	PRE TEST		POST TEST		Paired "t" test value
	MEAN	SD	MEAN	SD	
Experimental group	19.78	7.07	42.76	13.45	t = 16.00*
Control group	18.61	3.93	19.3	8.30	t = 1.1

* significant

H0 - There is no significant association between the pre test and post test levels of attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

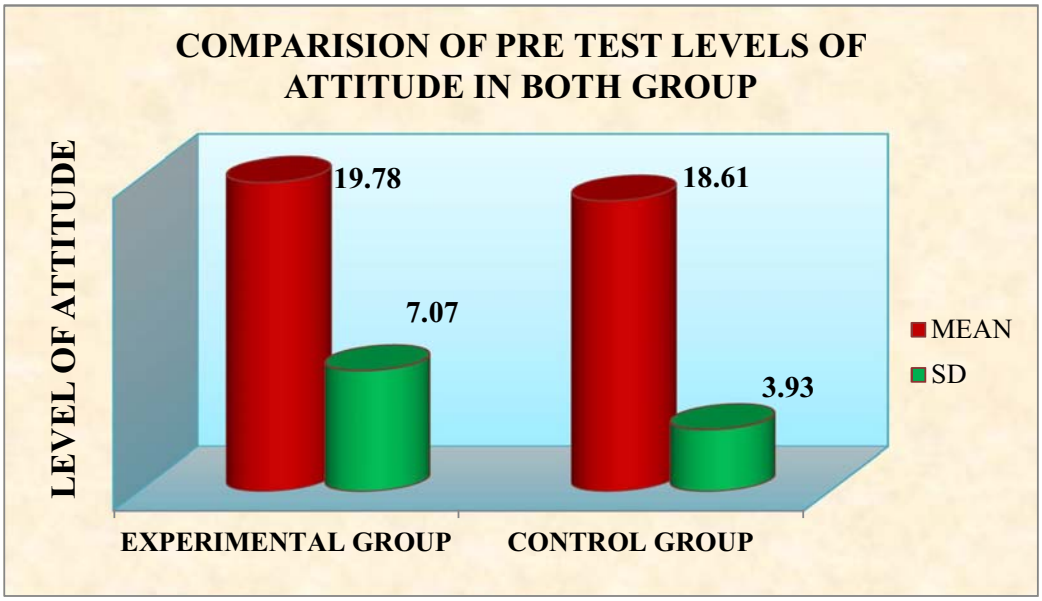
TABLE 4.7

Comparison of pre test and post test levels of attitude reveals that mean value 19.78 with standard deviation 7.07 of pre test has significant to the post test mean value 42.76 with standard deviation 13.45and the 't' value CV = 16.00 and TV = 2.0010 (CV > TV) which is significant at 0.05 level for experimental group.

Where as in the control group the analysis that mean value 18.61 with standard deviation 3.93 of pre test has significant to the post test mean value 19.3 with standard deviation 8.30 and the 't' value CV = 1.12 and TV = 2.0010 (CV > TV) which is not significant at 0.05 level for control group.

It shows the given computer assisted instruction was very effective.

FIUGRE 4.10 Comparison of pre test attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group



FIUGRE 4.11 Comparison of post test attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

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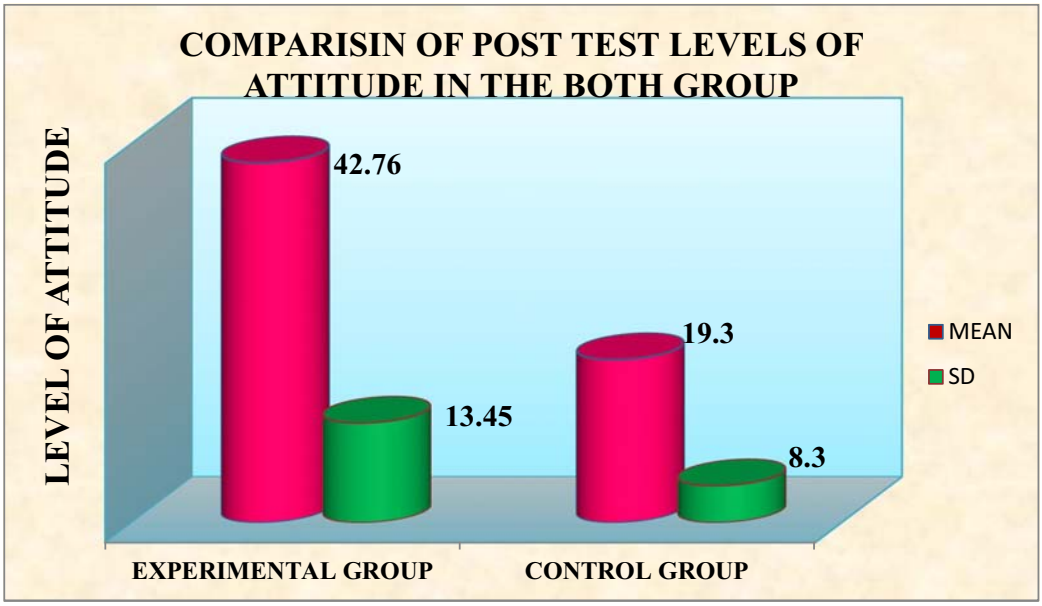


SECTION : 5

Comparison of experimental and control group levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children .

TABLE 4.8 Comparison of experimental and control group levels of knowledge regarding hazards of use of plastic products among the rural school children .

N=60(E)+60(C)=120

TEST	EXPERIMENTAL GROUP		CONTROL GROUP		Unpaired "t" test value
	MEAN	SD	MEAN	SD	
PRE TEST	8.58	2.88	9.18	3.44	t = 1.03
POST TEST	19.06	3.39	8.50	2.77	t = 20.37*

* significant

H_0 - There is no significant difference in the pre test and post test levels of knowledge between the experimental and control group.

TABLE 4.8 Comparison of pre test and post test levels of knowledge between the experimental and control group.

The analysis revealed that pre test mean value 8.58 with standard deviation 2.88 in the experimental group and the mean value 9.18 with standard deviation 3.44 in the control group and the 't' value CV = 1.03 and TV = 2.0010 (CV > TV) which is not significant at 0.05 level .For the post test mean value 19.06 with 3.39 standard deviation in experimental group ,where as in the control group the mean value 8.50 with standard deviation 2.77 and the 't' value CV = 20.37 and TV = 2.0010 (CV > TV) which is significant at 0.05 level. So the given CAI was effective.

FIGURE 4.12 Comparison of experimental and control group pre test level of knowledge regarding the hazards of use of plastic products among the rural school children.

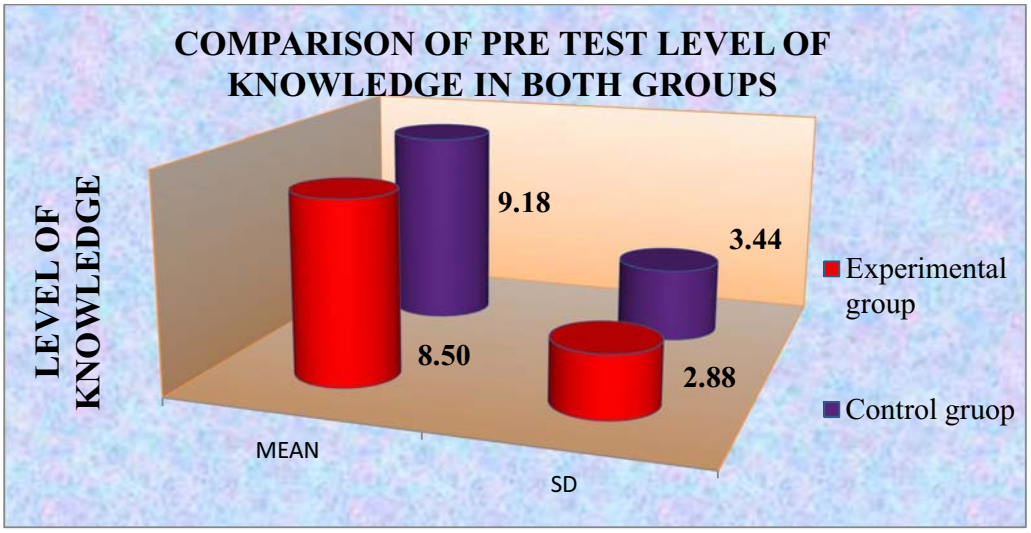


FIGURE 4.13 Comparison of experimental and control group post test level of knowledge regarding the hazards of use of plastic products among the rural school children.

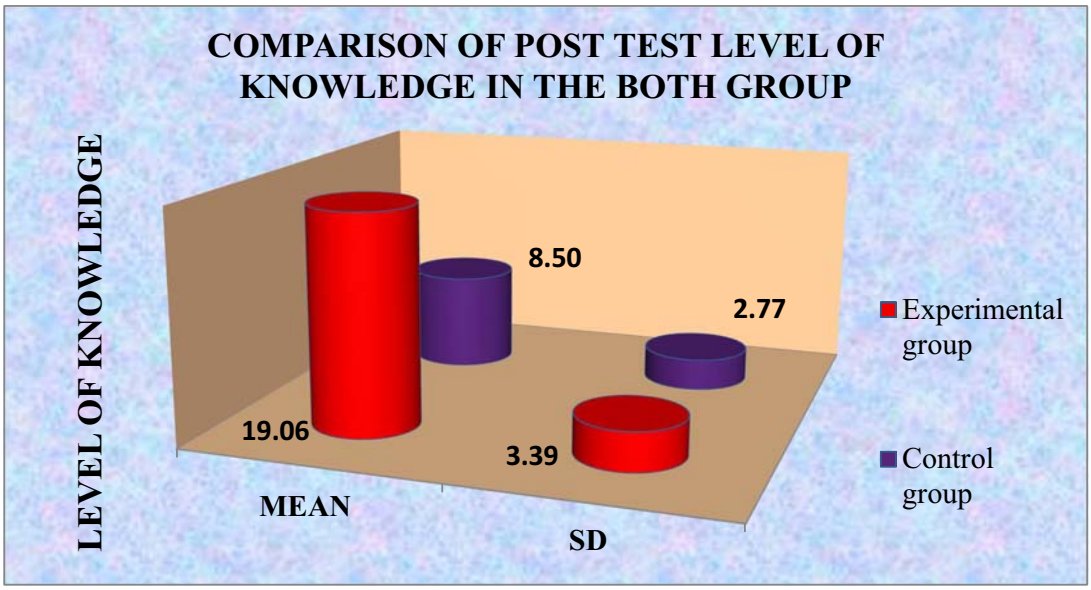


TABLE 4.9 Comparison of experimental and control group levels of attitude regarding hazards of use of plastic products among the rural school children .

N=60(E)+60(C)= 120

TEST	EXPERIMENTAL GROUP		CONTROL GROUP		Unpaired "t" test value
	MEAN	SD	MEAN	SD	
PRE TEST	19.78	7.07	18.61	3.93	t = 1.58
POST TEST	42.76	13.45	19.30	8.30	t=17.79*

* significant

H_0 - There is no significant difference in the pre test and post test levels of attitude between the experimental and control group.

TABLE 4.9 Represents the comparison of pre test and post test levels of attitude between the experimental and control group.

The analysis revealed that the pre test mean value 19.78 with standard deviation 7.07 in the experimental group and the mean value 18.61 with the standard deviation 3.93 in the control group and the 't' value CV = 0.59 and TV = 1.56(CV < TV) which is not significant at 0.05 level . For the post test mean value 42.76 with 13.45 standard deviation in experimental group ,where as in the control group the mean value 19.30 with standard deviation 8.30 and the 't' value CV = 17.79 and TV = 2.0010 (CV > TV) which is significant at 0.05 level.

The statistical analysis revealed that there is a highly significant difference in the post test levels of attitude of experimental as compared with the control group. So the given computer assisted instruction was effective .

FIGURE 4.14 Comparison of experimental and control group pre test level of attitude regarding the hazards of use of plastic products among the rural school children.

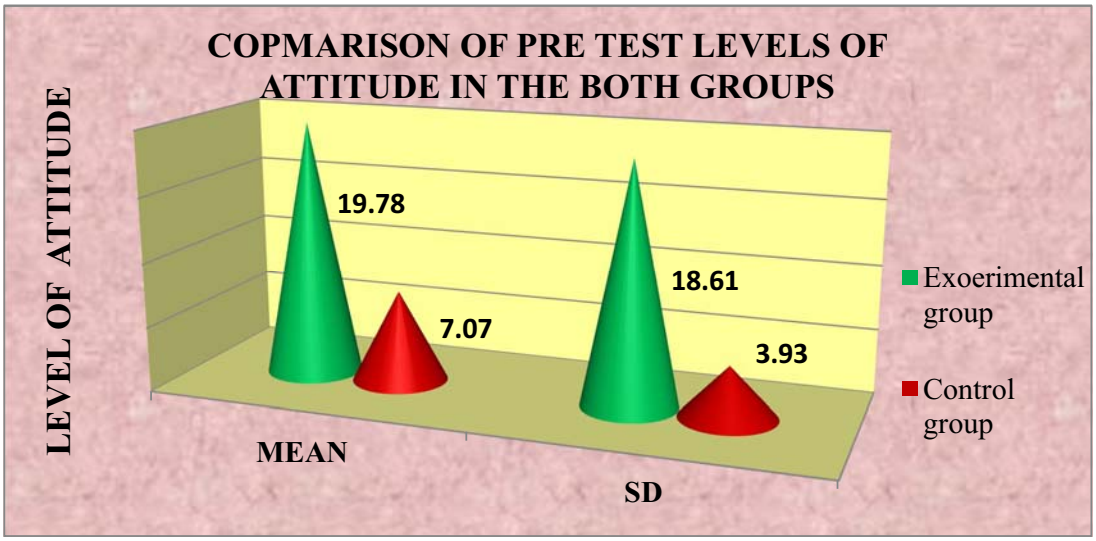
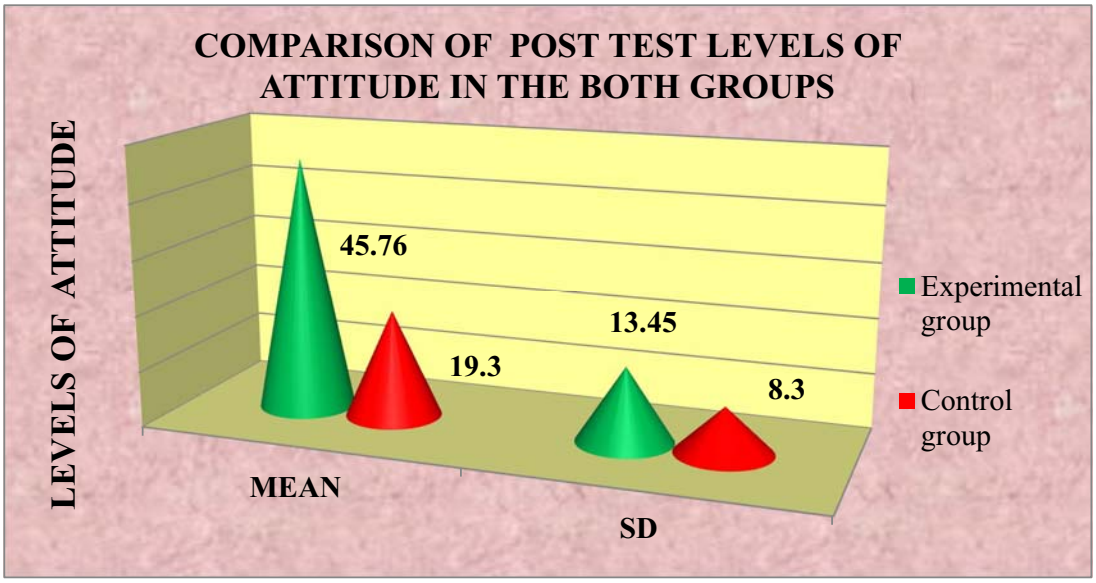


FIGURE 4.15 Comparison of experimental and control group post test level of attitude regarding the hazards of use of plastic products among the rural school children.



SECTION – 6

Assessment of correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

TABLE 4.10 Assessment of correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

N = 60(E) +60(C) =120

GROUP	POST TEST		POST TEST		" r" value
	MEAN	SD	MEAN	SD	
Experimental group	19.06	3.39	42.76	13.45	**r = 0.84** positive and highly significant.
Control group	8.50	2.77	19.3	8.30	**r = 0.31** positive and moderate significant

TABLE 4.10 Represents the correlation between the post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children in both experimental and control group.

In experimental group the mean value knowledge represents 19.06with standard deviation 3.39 and the mean value of expressed practice 42.76with standard deviation 13.45and the correlation r = 0.84 which is positive and highly significance for post test scores. Where as in control group the mean value of knowledge 8.50 with standard deviation 2.77and the mean value of attitude 19.3with standard deviation 8.30and the correlation r = 0.31 which is positive and moderate significance for post test scores of knowledge and attitude .Hence there is a positive and highly significant correlation between the knowledge and expressed practice of experiment group. It reveals the given CAI was effective.

SECTION : 7

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in both experimental and control group with their selected demographic variables.

TABLE 4.11

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in experimental group with their selected demographic variables.

N= 60

Demographic Variables	Level of knowledge						χ^2	Level of attitude						χ^2
	Inadequate		Moderately Adequate		Adequate			Inadequate		Moderately Adequate		Adequate		
	NO	%	NO	%	NO	%		NO	%	NO	%	NO	%	
Age														
a)13 years	26	43.3	6	10	-	-	9.74*	28	46.6	4	6.6	-	-	12.6*
b)14 years	15	25	10	16.6	-	-		16	26.6	9	15	-	-	
c)15 years	0	0	3	5	-	-		0	0	3	5	-	-	
Gender														
a)Male	29	48.3	4	6.6	-	-	12.9*	27	45	6	10	-	-	2.6
b)Female	12	20	15	25	-	-		17	28.3	10	6.6	-	-	
Education of the father														
a) Illiterate	22	36.6	5	8.3	-	-		23	38.3	4	6.6	-	-	
b) Primary	13	21.6	9	15	-	-		14	23.3	8	13.3	-	-	
c) High school	6	10	5	8.3			3.9	7	11.6	4	6.6	-	-	3.6
d) Higher secondary	-	-	-	-	-	-		0	0	0	0	-	-	
e) Diploma	-	-	-	-	-	-		0	0	0	0	-	-	
f) Degree	-	-	-	-	-	-		0	0	0	0	-	-	

Education of the mother														
a) Illiterate	25	43.3	9	15	-	-		27	45	7	11.6	-	-	
b) Primary	16	26.6	9	15	-	-	2.7	17	28.3	8	13.3	-	-	3.7
c)High school	-	-	1	1.6	-	-		0	0	1	1.6	-	-	
d)Higher secondary	-	-	0	0	-	-		0	0	0	0	-	-	
e)Diploma	-	-	0	0	-	-		0	0	0	0	-	-	
f)Degree	-	-	0	0	-	-		0	0	0	0	-	-	
Income of the family.														
a)<Rs 5,000	28	46.6	2	3.3	-	-		28	46.6	2	3.3	-	-	
b)Rs 5,001-Rs10,000	13	28.3	17	28.3	-	-	16.5*	16	26.6	14	23.3	-	-	12.2*
c)>Rs 10,001	0	0	0	0	-	-		0	0	0	0	-	-	
Area of residence														
a) Rural	33	55	6	10	-	-		33	55	6	10	-	-	7.2
b) Urban	0	0	0	0	-	-	13.6*	0	0	0	0	-	-	
c) Semi urban	8	13.3	13	21.6	-	-		11	18.3	10	16.6	-	-	
Previous of information														
a) Health personnel	0	0	0	0	-	-		0	0	0	0	-	-	
b) Friends	10	16.6	3	5	-	-	9.7	11	18.3	2	3.3	-	-	15.9*
c) Relatives	0	0	0	0	-	-		0	0	0	0	-	-	
d) Mass media	11	18.3	13	21.6	-	-		11	18.3	13	28.3	-	-	
e) None of the above	20	33.3	3	5	-	-		22	36.6	1	1.6	-	-	

*significant

H_0 - there is no significant association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in experimental group with their selected demographic variables.

TABLE 4.11 Shows the association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in experimental group with their selected demographic variables.

The analysis revealed that there is a significant association between the children's Age, Gender ,Income of the family and Area of residence of pre test level of knowledge and there was no significant association between the Education of the father and as well as the mother and Previous source of information .Where as in pre test levels of attitude revealed that there was a significant association with the children's Age, Income of the family, and Previous source of information and there is no significant association of Gender, Area of residence and Education of the father and as well as the mother in the experimental group at the significance of 0.05 level.

TABLE 4.12

Association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in control group with their selected demographic variables.

N= 60

Demographic Variables	Level of knowledge						χ^2	Level of attitude						χ^2
	Inadequate		Moderately Adequate		Adequate			Inadequate		Moderately adequate		Adequate		
	NO	%	NO	%	NO	%		NO	%	NO	%	NO	%	
Age														
a)13 years	28	46.6	5	8.3	-	-	11.4*	28	46.6	5	8.3	-	-	3.81
b)14 years	15	25	9	15	-	-		15	25	9	15	-	-	
c)15 years	0	0	3	5	-	-		2	3.3	1	1.6	-	-	
Gender														
a)Male	30	50	3	5	-	-	20.7*	30	50	3	5	-	-	9.88*
b)Female	13	21.6	14	23.3	-	-		15	25	12	20	-	-	
Education of the father														
a) Illiterate	24	40	7	11.6	-	-		26	43.3	5	8.3	-	-	
b) Primary	13	21.6	9	15	-	-		13	21.6	9	15	-	-	
c)High school	6	10	2	3.3	-	-	2.2	6	10	2	3.3	-	-	4.27
d)Higher secondary	0	0	0	0	-	-		0	0	0	0	-	-	
e) Diploma	0	0	0	0	-	-		0	0	0	0	-	-	
f) Degree	0	0	0	0	-	-		0	0	0	0	-	-	
Education of the mother														
a) Illiterate	24	40	7	11.6	-	-	6.26	25	41.6	6	10	-	-	3.70
b)Primary	19	31.6	9	15	-	-		20	33.3	8	13.3	-	-	
c)High school	0	0	1	1.6	-	-		0	0	1	1.6	-	-	
d)Higher secondary	0	0	0	0	-	-		0	0	0	0	-	-	
e)Diploma	0	0	0	0	-	-		0	0	0	0	-	-	
f)Degree	0	0	0	0	-	-		0	0	0	0	-	-	

Income of the family.														
a)<Rs 5,000	29	48.3	2	3.3	-	-	15.2*	29	48.3	2	3.3	-	-	11.7*
b)Rs 5,001-Rs10,000	14	23.3	15	25	-	-		16	26.6	13	21.6	-	-	
c)>Rs 10,001	0	0	0	0	-	-		0	0	0	0	-	-	
Area of residence														
a)Rural	32	53.3	3	5	-	-	16.1*	32	53.3	3	5	-	-	12.0*
b)Urban	0	0	0	0	-	-		0	0	0	0	-	-	
c)Semi urban	11	18.3	14	23.5	-	-		13	21.6	12	20	-	-	
Previous of information														
a)Health personnel	0	0	0	0	-	-	8.3	0	0	0	0	-	-	11.2
b)Friends	14	32.3	4	6.6	-	-		12	20	3	5	-	-	
c)Relatives	0	0	0	0	-	-		0	0	0	0	-	-	
d)Mass media	12	20	11	18.3	-	-		12	20	11	18.3	-	-	
e)None of the above	20	33.3	2	3.3	-	-		21	35	1	1.6	-	-	

*significant

H_0 - there is no significant association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in control group with their selected demographic variables.

TABLE 4.12 Shows the association between the pre test levels of knowledge and attitude scores regarding hazards of use of plastic products among the rural school children in control group with their selected demographic variables.

The analysis revealed that there is a significant association between the children's Age, Gender ,Income of the family, Area of residence and Previous source of information of pre test level of knowledge and there was no significant association between the Education of the father and as well as the mother .Where as in pre test levels of attitude revealed that there was a significant association with the children's Gender , Income of the family, and

Area of residence and there is no significant association of Age, and Education of the father and as well as the mother and Previous source of information in the control group at the significance of 0.05 level.

CHAPTER - V

DISCUSSION

CHAPTER – V
DISCUSSION

This chapter deals about the discussion of the study based on the objectives and the hypothesis of the study with the appropriate statistical analysis and the findings of the study.

The study was a quasi experimental – non equivalent (pre test post test control group)design. The problem stated as " A study to assess the effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the rural school children at selected rural schools, Thanjavur, Dt.

The study was conducted for 120 students in which 60 students are assigned to experimental group and 60 students are assigned to control group. Rural schools are selected by total population sampling technique. The study was conducted among the eighth standard rural school children.

Samples are selected by using total sampling technique. Pre test was conducted by using the semi structured knowledge questionnaire to assess the knowledge and attitude of the students was assessed by using likert scale for both group . II day computer assisted instruction was given to the students only to the experimental group . After one week the post test was conducted by using the same questionnaire and likert scale for experimental and control group.

The first objective to assess the knowledge and attitude regarding hazards of use of plastic products among the rural school children in experimental and control groups.

Assessment of pre test levels of knowledge regarding the hazards of use of plastic revealed that 41(68.66%) of the student had inadequate knowledge and 19(31.66%) of the students had moderately adequate knowledge in

experimental group regarding hazards of use of plastic products.In the control group 43(71.66%) of the student had inadequate knowledge and 17(28.66%) of the students had moderately adequate knowledge and none of them had adequate knowledge in both the experimental and control group regarding hazards of use of plastic products.

Assessment of post test levels of knowledge revealed that none of them had inadequate knowledge ,18(30%) had moderately adequate knowledge and 42(70%) had adequate knowledge in experimental group . Where as I the control group 41(68.33%) had adequate knowledge and 19(31.66%) had moderately adequate knowledge . And the post test levels of attitude revealed that none of them had adequate attitude ,21(35%) had moderately adequate attitude and 39(65%) had adequate knowledge in experimental group . Where as in the control group 43(71.66%) had inadequate attitude and 17 (28.33%) had moderately adequate attitude and none of them of had adequate attitude in control group .

Hence the experimental group had improved their knowledge and attitude regarding hazards of use of plastic products.

The second objective to evaluate the effectiveness of Computer Assisted Instruction regarding the hazards of use of plastic products among the rural school children in experimental and control groups.

In experimental group the pre test and post test scores of knowledge revealed that mean value 8.58 with standard deviation 2.88 of pre test has significant to the post test mean value 19.06 with standard deviation 3.39 and the 't' value CV = 24.11and TV = 2.0010 (CV > TV) which is significant at 0.05 level . In the pre test and post test scores of attitude pre test and post test levels of attitude reveals that mean value 19.78 with standard deviation 7.07 of pre test has significant to the post test mean value 42.76 with standard deviation 13.45 and the 't' value CV = 16.00 and TV = 2.0010 (CV > TV) which is significant at 0.05 level. Hence the given CAI was effective .

In the control group the pre test and post test scores of knowledge revealed that mean value 9.18 with standard deviation 3.44 of pre test has significant to the post test mean value 8.50 with the standard deviation 2.77 and the 't' value CV = 1.8348 and TV = 2.0010(CV>TV) the pre test mean 18.61 with standard deviation 3.93 which is significant to the post test mean value 19.3 with standard deviation 8.3 and the 't' value CV = 1.1217 and TV = 2.0010 (CV>TV) which is not significant at 0.05 level.

Hence the research hypothesis H_1 states that there is a significant difference between the pre and post test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children was accepted with the experiment group but the same it is rejected to the control group.

The third objective to compare the pre and post test levels of knowledge and attitude between the experimental and control groups regarding hazards of use of plastic products among the rural school children.

In the pre test mean levels of knowledge of experimental group 8.58 with SD 2.88 and for the control group 9.18 with SD 3.44 and the projected 't' value CV = 1.03 and TV = 2.001 (CV < TV) at 0.05 level. In the pre test mean levels of knowledge of experimental group 19.06 with SD 3.39and for control group 8.50 with SD 2.77and the projected 't' value CV = 20.37and TV = 2.001 (CV < TV) at 0.05 level .

In the pre test mean levels of attitude of experimental group 19.78with SD 7.07 and for the control group 18.61with SD 3.93and the projected 't' value CV = 1.58 and TV = 2.001 (CV < TV) at 0.05 level. In the pre test mean levels of attitude of experimental group 42.76 with SD 13.45 and for control group 19.3 with SD 8.3 and the projected 't' value CV = 17.79and TV = 2.00 (CV < TV) at 0.05 level .

Research hypothesis H_2 states that there is a significant difference in the post test levels of knowledge and attitude between the experimental and control group regarding hazards of use of plastic products among the rural school children. Hence the research hypothesis H_2 was accepted but the same it is rejected to the pre test levels of knowledge and attitude between the experimental and control group.

The fourth objective to correlate the post test scores of knowledge and attitude of rural school children regarding the hazards of use of plastic products among the rural school children in experimental and control groups.

The experimental group the mean post test value of knowledge was 19.06 with SD 3.39 and for attitude the value was 42.76 with SD 13.45 And the 'r' value 0.8 it revealed that there was a positive and highly significant correlation . Where as in control group the mean post test value of knowledge was 8.50 with SD 2.77 and in attitude the mean value 19.3 SD 8.30 and 'r' value 0.3 It revealed that there was a positive and moderate correlation between post test scores of knowledge and attitude regarding hazards of use of plastic products among the rural school children .

The fifth objective to determine the association between the pre test levels of knowledge and attitude regarding first hazards of use of plastic products among the rural school children with their selected demographic variables in experimental and control groups.

In the experimental group there was no significant association between the pre test levels of knowledge with the father's education, mother's education, Where as in attitude there was no significant association in gender ,father's education ,mother's education and area of residence. In the control group there was no significant association between the pre test levels of knowledge with the father's education, mother's education and previous source of information .Where as in attitude there was no significant association in

father's education, mother's education and previous source of information . So the research hypothesis H_4 was rejected.

Hence in experimental group there was a significant association between the knowledge with age, gender, income of the family ,area of residence and previous source of information and for attitude there was a significant association with age, income of the family and previous source of information. Where as in control group there was a significant association with in the knowledge level age, gender, income of the family ,area of residence and previous source of information and there was a significant association with age ,gender ,income of the family in the attitude so H_4 was accepted.

CHAPTER –VI

SUMMARY & CONCLUSION

CHAPTER –VI

SUMMARY AND CONCLUSION

SUMMARY

The present study was conducted to assess the knowledge and attitude of school children regarding hazards of use of plastic products. The study was a quasi experimental – non equivalent (pre test post test control group) design. A total 120 students (60 students experiment group and 60 students in control group)who meet the inclusion and exclusion criteria as the samples selected from the rural schools, Thanjavur , Dt. The samples where selected by total population sampling technique. The investigator first introduced herself to the samples and developed the communication with them. After the selection of Samples the interview conducted with the instruments .

The statistical analysis revealed the knowledge and attitude of the experiment group was calculated by the paired 't' test for knowledge ('t' =24.11) and for attitude ('t' =16.00). This proves that there was a significant difference in pre test and post test levels of knowledge and attitude for the experiment group at 0.05 level. Where as in control group the knowledge level was ('t' =1.83) indicates no difference in knowledge and for attitude ('t' =1.12) was revealed there was no difference in pre and post test attitude for the control group at 0.05 level. So the given CAI was effective.

The statistical analysis for the comparison of knowledge and attitude of the experiment group and the control group was calculated by the unpaired 't' test for pre test knowledge ('t' =1.08) it showed no difference in knowledge and for attitude ('t' =1.56). This proved that there is a no significant difference in attitude . Where as in post test the knowledge level was ('t' =20.37) and for attitude('t' =17.79) this revealed that there is a significant difference in post test knowledge and expressed practice for the experiment and control group.

The statistical analysis for correlation between the post test scores of knowledge and attitude of the experiment and control group was calculated by "Karl Pearson correlation test" stated that in experimental group the post test scores of knowledge mean value is 19.06with SD 3.39and the post test scores of attitude the mean value is 42.76 with SD 13.45. And the 'r' value (r =0.8) it revealed that there is a positive and highly significant correlation between the knowledge and attitude regarding hazards of use of plastic products. In control group the mean post test value of knowledge was 8.50 with SD 2.77and in attitude the mean value 19.3with SD 8.3and 'r' value (r = 0.3) it revealed that there was a positive and moderate significant correlation between the knowledge and attitude regarding hazards of use of plastic products.

The statistical analysis determined the association between the pre test levels of knowledge and attitude regarding hazards of use of plastic products among the rural school children with their selected demographic variables was calculated by using 'chi square test'. The results were stated that in experiment group towards the knowledge there is a significant association with age, sex, income of the family residence , previous source of information and attitude there is a significant association with age, , income of the family, previous source of information .Where as in control group towards the knowledge level there is a significant association with age, income of the family, residence, and attitude level there is a significant association with sex, residence, income of the family.

CONCLUSION

The main objective of the study was to determine the effectiveness of Computer Assisted Instruction on knowledge and attitude regarding hazards of use of plastic products among the rural school children at selected rural schools, Thanjavur, Dt. The statistical analysis revealed that there was a significant difference between the pre test and post test level of the knowledge

and attitude of experiment group ,thus indicated the given Computer Assisted Instruction was effects.

NURSING IMPLICATIONS

The present study had certain nursing implication towards the nursing education , nursing practice ,nursing administration and nursing research as follows.

NURSING EDUCATION

The nursing education is framed such a way that it equip the nurses with the essential knowledge ,attitude and skills for meeting the needs of the society at primary , secondary and tertiary levels.

The nursing curriculum also include the hazards of plastic usage in child health nursing .

It help them the to know the mortality and morbidity in children , needs to take action to avoid using of plastic products.

NURSING PRACTICE

The nurses working in different health care setting play a vital role in enhancing the quality of life of individual and family members especially in paediatric care unit.

This study will help the paediatric care unit nurses develop their knowledge & skill in using equipment's while treating the children . It also help the nurses to create awareness among the hospitalized children .

The community health nurse participate in school health programmes to give health education to the students regarding the hazards of plastic products use.

NURSING ADMINISTRATION

The nursing administration should make necessary initiatives of :

- Collaborate with governing bodies to formulate standard policies and to emphasize the policies to the society.
- Organize the seminars , workshop, conferences regarding plastic hazards and proper disposal of waste among the nursing staffs and as well as in student nurses .

NURSING RESEARCH

- Promote more research on hazards of plastic use among the various settings.
- Disseminates the findings of the research through conferences , seminars and publishing in the journals.

RECOMMENDATIONS

- The comparative study can also be done to assess the effectiveness of CAI among rural and urban school children.
- The study can be done on large sample size to generalize the effectiveness of CAI.
- An experimental study can be done to assess the effectiveness of CAI / STP regarding hazards of use of plastic products among the mother's of school children.

REFERENCES

REFERENCES

TEXT BOOK REFERENCES

1. Arora, P.N .,& Malhan, P.K . (2010) *Biostatistics.* 2nd Edition . New Delhi: Himalaya Publishing House.
2. Burns.(1993). *The Practice of Nursing Research Conduct, Critique and Utilization.*2nd Edition. Philadelphia: W.B Saunders Company
3. Barbara Sattler,RN ,Dr PH .*Environmental Health and Nursing Practice.* Springer publication.
4. Basavanthappa , B.T . (2007). *Nursing Research* . 2nd Edition. New Delhi : Jaypee Publication.
5. Chin J.(2008).*Theory and Nursing A systematic Approach* . London: Mosby publication.
6. Collet Clifford., & Louis Harum.(2000). *Inferential Statistics in Nursing and Health Care.* 1st New York: Churchill Livingston Publication.
7. Dr. Vasundhra Tulasi .T. (2011). *Nursing Research and Statistics*. 1st Hyderabad: Frontline Publication.
8. D.V.Rosato.,& Marlene, G. Rosato . (2000) . *Concise Encyclopaedia of Plastics.* Springer Science Bussines Media :New York.
9. Denis . F. Polit .,& Chery Tetana Beck .(2004) . *Nursing Research.* 7th Edition . Philadephia : Lippincott Williams and Wilkins.
10. Elakkuvana Bhaskara Raj. D. (2012) . *Nursing Research and Bio Statistics*. 2nd Edition . Bangalore: EMMESS publication.
11. Fawcent .(2008). *Analysis and Evaluation of Conceptual Models of Nursing* . New Delhi : F .A .Davis Company.
12. Gatins DE, et,al., (2003) *Research Methodology and Techniques*.4th Edition . New Delhi: International Publishers.
13. Gupta ,S.P .(2003). *Statistical Methods.* 31st Edition . India: Sultan Chand Educational Publication.

14. Guru Mani. N. (2010). *An introduction to Biostatistics.*2nd Edition . Chennai: MJP Publication.
15. Hesinssen.,et al (2000). *Intervention Research.*1st Edition Philadelphia: Routledge Publishers.
16. Jacqueline. (2000). *Analysis and Evaluation Of Contemporary Nursing Knowledge, Nursing Models And Theories.* 2nd Edition . Philadelphia: F.A Davis Company.
17. Herman Koren ,R.E.H.S.,M.P.H.,H.S.D.,(1995) .*Handbook of Environmental Health* .Lewis publication.
18. Himmat Singh.(2001). *Green Revolution Reconsidered* . New York : Oxford publication.
19. Jacqueline. (2000). *Analysis and Evaluation Of Contemporary Nursing Knowledge, Nursing Models And Theories*. 2nd Philadelphia: F.A Davis Company.
20. Janet Houser. (2011). *Nursing research*. 1st . New Delhi: Jones and Bartlett India Pvt. Ltd.
21. J.M.G. Cowie . *Polymers : Chemistry & and Physics of Modern Materials.* Nelson Thornes publication.
22. Kothari ,B, et al., (1998). *Research Methodology Methods and Techniques.* Wiler Estern Limited.
23. Mahajan B .K. (1997) . *Methods in Biostatistics*. 8th Edition . New Delhi : Jaypee publication.
24. Potter ,& Perry .P. (2009) . *Basic Nursing Theory and Practices* . 9th Edition. USA Mosby publications.
25. Purohit ., & Kakrani . *Air Environment and Pollution*. India : Ayrabios.
26. Suzanne . M. Snedeker .(2014) . *Toxicants in Food Packaging and Household Plastic* : *Exposure and Health Risks to consumers* . London : Springer – Verlag .

27. Sundar.Rao . P.S.S .,& Richard .J.(2006).*Introduction to Biostatistics and Research Methods.* 4th Edition . New Delhi : Prentice Hall.
28. Suresh .K. Sharma. (2012) . *Nursing Research and Statistics* .India: Elsevier publication .
29. T.R. Grompton M. SC ., F.R.I.C., M.Anal.Chem. *Additive Migration From Plastic Into Food.* (2013) . New York : Oxford publication.
30. V.K.Ahluwalia .(2004).*New Trends In Green Chemistry*. M. Kidwai publication.
31. Wasley .L.Ruby. (1995) . *Nursing Theories and Models* . 2ndEdition . New Delhi : Spring House Corporation .

JOURNAL REFERENCES

1. Alexannder G.J.Driedger et al .,(2015) Plastic debris in the Laurentian Great Lakes: A Overview. *Journal of Great Lakes Research.* Mar.Vol41(1), 9-19.
2. Antonia M Calafat,(2009) Exposure to Bisphenol A and other phenols in Neonatal Intensive Care Unit Premature Infants .*Journal of Environmental Health Perspectives* **.**Apr .Vol -117(4), 639-644.
3. Anwar Johari et al.,(2014).Municipal Solid Waste Management and Potential Revenue from Recycling in Malaysia. *Journal of Modern Applied Science.* June . Vol – 8(4),37-48.
4. Bhandari R, Xiao J and Shankar A. (2013) . Urinary bisphenol A and obesity in U.S. children. *American Journal of Epidemiology* **.** Jun. Vol -177(11) , 1263-70.
5. Bittner GD, Yang CZ and Stoner MA. (2013) . Estrogenic chemicals often leach from BPA-free plastic products that are replacements for BPA-containing polycarbonate products. *Journal of Environmental Health : a global access science source***.** May.Vol -13(1) ,41.

6. Cherly Erler , Julie Novak .(2013) . Bisphenol- A and Exposure : Human Risk and Health Policy . *Journal of Paediatric Nursing* .July.vol-25(5),400-407.
7. Delilah Lithner et al., (2011) . Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition. *Journal of Science of The Total Environment***.** Aug .Vol-439(180), 3309–3324.
8. Fauziah S.H, Liyana IA, Agamuthu P.(2012). Plastic debris in the coastal environment: The invincible threat? Abundance of buried plastic debris on Malaysian beaches. *Journal of Waste Management Resource.* Jun.
9. Ferderiksen H et al., (2013)**.** Urinary excretion of phthalate metabolites, phenols and parabens in rural and urban Danish mother-child pairs. *International Journal of Hygiene and Environmental Health*. Nov. Vol -216 (6) , 772-83.
10. Garcia E, Hurley S, Nelson Do, Hertz A and Reynolds P.(2015).Hazardous air pollutants and breast cancer risk in California teachers: a cohort study. *Journal of Environmental Health : a global access science source.* Jan .Vol – 14(1) , 14.
11. Hoarau L, Ainley L, Jean C, Ciccione S **.**(2014). Ingestion and defecation of marine debris by loggerhead sea turtles, Caretta caretta, from by-catches in the South-West Indian Ocean. *Journal of Marine Pollution Bulletin.* July . Vol -84(1).90-96.
12. Jhonson C et al ., (2013) . Prenatal and early childhood bisphenol A concentrations and behaviour in school-aged children. *Journal of Environmental Science* . Oct .Vol – 126 , 43-50.
13. Josyula S et al ., (2015). Household air pollution and cancers other than lung: a meta-analysis. *Journal of Environmental Health : a global access science source***.** March. Vol -14 , 24.

14. Klein S, Worch E, Knepper TP.(2010). Occurrence and Spatial Distribution of Micro plastics in River Shore Sediments of the Rhine-Main Area in Germany. *Journal of Environmental & Science Technology.* May.
15. Losa-Ward SM et al.,(2012) **.** Disrupted organization of RFamide pathways in the hypothalamus is associated with advanced puberty in female rats neonatally exposed to bisphenol A. *Journal of Biology of Reproduction* .Aug. Vol -87(2),28.
16. Nelson JW et al ., (2012) . Social disparities in exposures to bisphenol A and polyfluoroalkyl chemicals: a cross-sectional study. *Journal of Environmental Science : a global access science source* . Mar. Vol -11,10.
17. Neeti Rustagi , S. K. Pradhan and Ritesh Singh ,(2011). Public health impact of plastics: An overview **.***Indian Journal of Occupational & Environmental Medicine* **.**Sep-Dec. Vol -15(3) , 100-103.
18. Mr. Mangesh .V. Jabade , Amey.M. Khande. A study to assess the knowledge regarding the hazards of plastic use among adolescent students of selected high school, Belgam with a view to develop an informational booklet. *International Journal of Scientific Research.* May. Vol 4(5),
19. Mandy Fishes et al., (2015) .Bisphenol - A and phathate metabolite urinary concentration : Daily and a cross pregnancy variability . *Journal of Exposure Science and Environmental Epidemiology.*
20. Marcus Eriksen et al., (2014).Trash researcher tallies ocean pollution *.Journal of Public Library of Science One***.** Dec. Vol-187,4.
21. R.k.Srivastava and Sushila Gorara , (2013*)* .Use of polycarbonate plastic products and human health. *International Journal of Basic & Clinical Pharmacology* .Vol - 2(1), 12-17.

22. Ramji. K , Bhandari et al., (2014) . Trans generational effects from early developmental exposures to Bisphenol –A or 17α-ethinylestradiol in medaka. *Journal of Scientific Reports***.** Nov .
23. Singh M.k .and Singh Retta Devi,(2013) . Hazards of plastic bags in dholpur. *International Journal of Environmental Science* **.**Mar.Vol-2(3), 6-10.
24. Soliman AS (2013), Bisphenol A-associated epigenomic changes in prepubescent girls: a cross-sectional study in Gharbiah, Egypt. *Journal of Environmental Science : a global access science source* .Apr. Vol- 12, 33.
25. Stephanie L. Wright et al ., (2013) . The physical impacts of micro plastics on marine organism: A review . *Journal of Environmental Pollution* .July .Vol 178, 483-492.
26. Vandenberg LN et al.,(2013) . Human exposures to bisphenol -A:mismatches between data and assumptions. *Journal of Review of Environmental Health.*Vol -28(1) ,37-58.
27. Mrs .Suja Santosh P.S .(2012) ,Pastic pollution :An Environmental Hazards. *Journal of Health Action*. Sep.
28. Takseen A ,Naeem I and Atif M.,(2012). Evaluation of Bisphenol -A Contents : A case study. *West Indian Medical Journal* **.**Nov .Vol -61(6).

REPORTS

The Times of India 2013

Environmental Health Prospective -October 6

Annual Review of Public Health 2010

Health Day News 2013

Annual Reviews Mobile 2010

The Environmental Health News 2009

NET REFERENCES

www.sciencedirect.com/science/s0380133015000064

www.gooleweblgh.com/theglobal journals.com

www.timesofindia.com/home/enviroment/pollution/plasticwaste

www.journalelsevier.com

www.annualreviews.org/toc/pubhealth/31/1

www.pubmed.com

www.nature.com

www.encylopedia.com

www.sustainableplastics.org

www.goodhousekeeping.com/-of-plastic

www.grainer.com/content/at-types-of-plastic

www.profeessionalplastic.com/plastic

www.norden.org

ANNEXURE

REQUISITION FOR VALIDITY

FROM

Mrs. JAYANTHI , II year M.Sc(N),

Our Lady of Health College of Nursing ,

Thanjavur.

(Through Principal)

TO

_____

_____

RESPECTED MADAM /SIR,

Subject : Requisition for content validity regarding the hazards of use of plastic products.

I am M.Sc. Nursing student of Our Lady of Health College of Nursing . Thanjavur . As part of my course . I am doing a study on the topic mentioned below.

TOPIC : "A study to assess the effectiveness of computer assisted instruction on knowledge and attitude regarding hazards of use of plastic products among the school children at selected rural schools, Thanjavur ,Dt."

May I request you to go through and validate the content regarding hazards of use of plastic products. Please enlighten me with your valuable suggestion for modifying the computer assisted instruction .

Thanking you in anticipation

Place : Yours sincerely ,

Date: Ms .S. Jayanthi.

LIST OF EXPERTS

MEDICAL EXPERTS

1. **Dr .Thangasaravanan.M.D., Pediatrics.**
   Consultant Paediatrician,
   Our Lady of Health Hospital,
   Thanjavur.
2. **Dr . B.Rajesh .M.B.B.S, D.C.H.**
   Consultant Paediatrician.
   Our Lady of Health Hospital,
   Thanjavur**.**

NURSING EXPERTS

1. **Mrs . Sujatha M.Sc (N) . Ph .D.,**
   Associate Professor,
   PIMS College of Nursing,
   Pondicherry.
2. **Mrs . Parasakthi M.Sc (N),**
   Vice Pricipal,
   Dr .G . Sakunthala College of Nursing,
   Trichy.
3. **Mr. Venkatesen M .Sc (N),**
   Associate Profeesor,
   Vinayaka Mission College of Nursing,
   Pondicherry.

TOOLS – SEMI STRUCTURED QUESTIONNAIRE

PART - I - DEMOGRAPHIC VARIABLES

Sample No :_____

1. Age of the student

   a) 13 years

   b) 14 years

   c) 15 years

2. Gender

   a) Male

   b) Female

3. Education of the father

   a) Illiterate

   b) Primary

   c) Secondary

   d) Higher secondary

   e) Diploma

   f) Degree

4. Education of the mother

   a) Illiterate

   b) Primary

   c) Secondary

d) Higher secondary

e) Diploma

f) Degree

5. Monthly income of the family

a) Below Rs 5,000

b) Rs 5,000-10,000

c) Above Rs 10,000.

6. Area of residence

a) Rural

b) Urban

c) Semi –urban

7. Previous source of information

a) Health professionals

b) Friends and relatives

c) Mass media

d) None

PART– II - SEMISTRUCTRUED KNOWLEDGE QUESTIONNAIRE

1. How many types of plastics are there?

   a. 2

   b. 4

   c. 6

2. Which type of plastic softens and melts in heat?

   a. Thermoset

   b. Thermocline

   c. Thermo plastics

3. What is the expansion of PVC?

   a. Polyvinyl chloride

   b. polyvinyl carbon

   c. polyvinyl chromite

4. How many types of polyethylene plastics are there ?

   a. 4

   b. 2

   c. 6

5. Which plastic is used for making cookware?

   a. Teflon

   b. Polyvinyl chloride

   c . Polypropylene

6. which plastic is used for making zippy cups and water bottles ?

a. Polyvinyl chloride

b. Nylon

c. Bisphenol – A

7. Which one of the following plastic products used by school children's ?

a. Syringes and Containers

b. Water bottles and Tiffin boxes.

c. Bottles and Syringes

8. How many years do take for the degradation of plastic materials?

a. 4-10 years

b. 40-100 years

c. 400-1000 years

9. Which among the household waste is hazardous to health?

a. Wooden items

b .Glass items

c. Plastic items.

10. Which of the following disease is caused by plastics?

a. Skin disease and cancer

b. Diarrhoeal disease and abdomen distension

c. Typhoid and dengue

11. How the plastic may affect the children?

a. Causes kwashiorkor

b. Causes marasmus

c . Causes obesity

12. What is the chemical name for building block of " Polycarbonate" plastics ?

a. Bakelite

b. Bisphenol-A

c. Epoxy.

13. Which one of the behavioural problems caused by bisphenol –A?

a. Attention deficit hyperactivity disorder & Autism

b. Enuresis & Encopresis disorders

c. Speech & Sleep disorder

14 . What health problem is caused by bisphenol –A in girls ?

a. Early onset of puberty

b. Delayed onset of puberty

c. Not attain puberty

15. What is the risk associated with plastic use?

a. Breast cancer

b. Blindness

c. Deafness

16. What is the name of the layer formed by non –degraded plastics in the ocean?

a. Curdles

b. Nurdles

c. Hurdles

17. What is the effect of bio –degradable plastics?

a. Nitrogen emission

b . Cadmium emission

c . Methane emission

18. What is the symbol of recycle?

a. 

b. 

c. 

19. What is the recycle code of polypropylene plastics?

a .4

b. 1

c. 5

20. What is the recycle code of Bisphenol –A?

a. 1

b. 7

c. 3

21. Which recycle code of plastic should be avoided ?

a. 3, 6 & 7

b. 2, 4.& 5

c. 1, 2 & 4

22. Which recycle code of plastic is safe for food storage?

a. 1,2 ,3,& 4

b. 1,2, 4,& 5

c. 1,3, 4 & 5

23. What is the thickness of carry bags to be easily degraded?

a. Less than 40 micron

b. 40 micron

c. More than 40 micron

24. What is the European standard symbol denotes safe plastic use ?

a. CE

b. EC

c. CC

PART - III - ATTITUDE QUESTIONNAIRE

ITEM	Strongly Disagree 1	Disagree 2	Uncertain 3	Agree 4	Strongly Agree 5
1. Excessive use of plastic materials cause problems to our health and environment. 2. Some of the plastic materials made up of harmful chemicals. 3.Stainless steel & paper bags can be used instead of plastic materials . 4. Recycling of plastic materials can minimize the environmental hazards. 5. Checking the recycle codes of plastic materials before use is necessary. 6. Reduce the use of plastic materials to minimize the health hazards by using wooden ,metal &paper materials. 7. Carry bags not used for storing hot and cold drinks. 8. Plastic debris is not a cause global warming. 9. The food items not to kept in the plastic containers for refrigeration. 10. Usage of plastic materials causes miscarriage. 11.Strict legislations minimize the health plastic use. 12. plastic chemicals affect the growth and development of children.					

KEY ANSWERS

1	a	13	a
2	c	14	a
3	a	15	a
4	b	16	b
5	a	17	c
6	c	18	c
7	b	19	c
8	b	20	b
9	c	21	a
10	a	22	b
11	c	23	c
12	b	24	a

பிரிவு -1 - தனி நபர் விபரம்

குறிப்பு : கீழ் வரும் கேள்விகளை கவனமாக படித்து பொருத்தமான இடத்தில் குறியிடவும். தங்களின் பதில்கள் நம்பிக்கையுடன் வைத்துக்கொள்ளபப்படும் . இது ஆராய்ச்சி தேவைக்காக மட்டும் பயன்படுத்தப்படும்.

பங்கேற்பாளர் எண்:

1) மாணவரின் வயது .

அ)13 வயது

ஆ)14 வயது

இ)15 வயது

2) பாலினம்.

அ)ஆண்

ஆ) பெண்.

3) தந்தையின் கல்விநிலை.

அ) படிப்பறிவு இல்லாதவர்

ஆ) தொடக்கக்கல்வி

இ) உயர் நிலை கல்வி

ஈ) மேல் நிலை கல்வி

உ) பட்டய படிப்பு

ஊ) பட்டபடிப்பு

4) தாயின் கல்விநிலை.

அ)படிப்பறிவு இல்லாதவர்

ஆ) தொடக்கக்கல்வி

இ) உயர் நிலை கல்வி

ஈ) மேல் நிலை கல்வி

உ) பட்டய படிப்பு

ஊ) பட்டபடிப்பு

5) குடும்பத்தின் மாத வருமானம் .

அ)ரூ-5,000 திற்கு கீழ்

ஆ) ரூ -5,001-10,000

இ) ரூ 10,001 திற்கு மேல்.

6. குடியிருப்பு பகுதி .

அ) கிராமம்

ஆ) நகரம்

இ) நகரம் சார்ந்த

7. முந்தைய தகவல் மூலம் .

அ) உடல் நலம் சார்ந்த தொழில் புரிபவர்

ஆ) நண்பர்கள்

இ) உறவினர்கள

ஈ) ஊடகங்கள்

உ) இவை எதுவுமில்லை

பிரிவு -II

பிளாஸ்டிக் பயன்படுத்துவதால் ஏற்படும் தீமைகள் குறித்த அறிவுத்திறனை கணிக்கும் கருவி /பிளாஸ்டிக் பற்றிய பொதுவான தகவல்.

1) எத்தனை வகையான பிளாஸ்டிக் உள்ளன?

அ) 2

ஆ) 4

இ) 6

2) வெப்பபடுத்தும் போது வளைவதும் மற்றும் உருகும் பிளாஸ்டிக் எந்த வகையை சார்ந்தது?

அ) தெர்மொசெட்ஸ்(thermosets)

ஆ)தெர்மொகளின் (thermocline)

இ)தெர்மோ பிளாஸ்டிக் (thermoplastic)

3) பி.வி.சி (P.V.C) விரிவாக்கம் என்ன?

அ)பாலிவினைல் குளோரைட். (Polyvinyl chloride)

ஆ)பாலிவினைல் கார்பன் (Polyvinyl carbon)

இ)பாலிவினைல் குரொமைட் (Polyvinyl chromite)

4) பாலி எத்திலினில் எத்தனை வகைகள் உள்ளன ?

அ) 4

ஆ) 2

இ) 6

5) சமைப்பதற்கான பொருட்கள் தயாரிப்பதில் எந்த வகையான பிளாஸ்டிக் பயன்படுகிறது ?

அ) டெப்லான் (Teflon)

ஆ) பாலிவினைல் குளோரைட்(Polyvinyl chloride)

இ) பாலிப்ரொப்ய்லின் (Polypropylene)

6) உறிஞ்சு டம்ளர் மற்றும் தண்ணீ ர் பாட்டில் தயாரிப்பதில்வகையான பிளாஸ்டிக் பயன்படுகிறது ?

அ) பாலிவினைல் குளோரைட் (Polyvinyl chloride)

ஆ) நய்லோன் (Nylon)

இ) பிஸ்பினால் - எ (Bisphenol – A)

7) பின்வருவனவற்றுள் பள்ளி செல்லும் குழந்தைகளால் பயன்படுத்தப்படும் பிளாஸ்டிக் பொருட்கள் எவை ?

அ) ஊசிகள் மற்றும் டப்பாக்கள்

ஆ) தண்ணீ ர் பாட்டில் மற்றும்

இ) பாட்டில் மற்றும் ஊசிகள் .

8) பிளாஸ்டிக் பொருட்கள் மக்குவதற்கு எத்தனை வருடம் எடுத்துகொள்கின்றன?

அ) 4-40 வருடம்

ஆ) 40 -100 வருடம்

இ) 400-1000 வருடம்

9) வீட்டு கழிவுகளில் எந்த கழிவுகள் உடல் நலத்திற்கு தீமை விளைவிக்கும்?

அ) மரக்கழிவு

ஆ) கண்ணாடி கழிவு

இ) பிளாஸ்டிக் கழிவு

10) கீழ்கண்டவற்றுள் எந்த நோய் பிளாஸ்டிக்கினால் ஏற்படுகிறது?

அ) தோல் நோய் மற்றும் புற்று நோய்

ஆ) வற்றுபோக்கு மற்றும் வயிறு உப்புதல்

இ) டைஃபாய்டு மற்றும் டெங்கு

11) பிளாஸ்டிக் குழந்தைகளை எவ்வாறு பாதிக்கிறது.

அ) காய்ச்சல் காரணியாகிறது

ஆ) உடல் எடை குறைவு காரணியாகிறது

இ) உடல் பருமன் காரணியாகிறது

12) பாலிகார்போனட் பிளாஸ்டிக்கின் வேதிப்பொருள் தொகுதி பெயர் என்ன?

அ) பாக்கிளிடே (Bakelite)

ஆ) பிஸ்பினால் -எ (Bisphenol – A)

இ) எபோக்ஸ்சி (epoxy)

13) பிஸ்பினால் -எ யினால் எந்த நடத்தை பிரச்சனை உருவாகிறது?

அ) கவன பற்றாகுறை உயர் நடவடிக்கை நோய் மற்றும் மன இருக்கம்.

ஆ) தன்னை அறியாமல் சிறுநீர் மற்றும் மலம் கழித்தல் .

இ) பேசுதல் மற்றும் உறங்குவதில் குறைபாடு

14) பிஸ்பினால் -எ யினால் பெண்களுக்கு என்ன உடல் நல குறைபாடு ஏற்படுகிறது?

அ) சிறுவயதில் பருவமடைதல்

ஆ) தாமதமாக பருவமடைதல்

இ) பருவமடையாமல் இருத்தல்

15) பிளாஸ்டிக் பயன்படுத்துவது தொடர்பான அபாயம் என்ன ?

அ) மார்பக புற்றுநோய்

ஆ) கண்பார்வை இழப்பு

இ) செவிடுதன்மை

16) கடலின் மேற்பரப்பில் மக்காத பிளாஸ்டிக்கினால் ஏற்படும் அடுக்கின் பெயர் என்ன?

அ) கர்டுல்ஸ் (curdles)

ஆ) நர்டுல்ஸ் (nurdles)

இ) ஹர்டுல்ஸ் (hurdles)

17) உயிர் -மக்கும் பிளாஸ்டிக் விளைவு என்ன ?

அ) நைட்ரோஜென் மாசு

ஆ) காட்மியம் மாசு

இ) மீத்தேன் மாசு

18) மறுசுழற்சி குறியீடு என்ன?

அ) 

ஆ) 

இ) 

19) பாலிப்ரொபைலின் பிளாஸ்டிக்கின் மறுசுழற்சி குறியீடு எண் என்ன?

அ) 4

ஆ) 1

இ) 5

20) பிஸ்பினால் - எ பிளாஸ்டிக்கின் மறுசுழற்சி குறியீடு எண் என்ன?

அ) 1

ஆ) 7

இ) 3

21) எந்த மறுசுழற்சி குறியீடு எண் கொண்ட பிளாஸ்டிக்கை உபயோகிக்க கூடாது ?

அ) 3, 6 & 7

ஆ) 2,4 & 5

இ) 1, 2 & 4

22) எந்த மறுசுழற்சி குறியீடு எண் கொண்ட பிளாஸ்டிக்கை உபயோகிக்கலாம் ?

அ) 1 , 2 ,3 & 4

ஆ) 1, 2 ,4 & 5

இ) 1, 3 , 4 & 5

23) எளிதில் மக்கும் தன்மையுடைய பிளாஸ்டிக் பைகளின் தடிமன் என்ன ?

அ) 40 மைக்ரானிற்கு குறைவு .

ஆ) 40 மைக்ரான்

இ) 40 மைக்ரானிற்கு அதிகம் .

24) பாதுகாப்பான பிளாஸ்டிக் உபயோகிப்பதற்கான யுரோபியன் நியமம் என்ன ?

அ) CE

ஆ) EC

இ) CC

பிரிவு - III - அணுகுமுறை கேள்வித்தாள்

	வலுவாக ஒப்பு கொள்ள வில்லை 1	ஒப்பு கொள்ள வில் லை 2	தெளிவு இல்லை 3	ஒப்பு கொள் கிறேன் 4	வலுவாக ஒப்பு கொள்கி றேன் 5
1.பிளாஸ்டிக் பொருட்களை அதிகமாக பயன்படுத்துவது நம் உடல் நலம் மற்றும் சுற்றுச்சூழல் பாதிப்பை ஏற்படுத்துகிறது. 2.பிளாடிக் பொருட்களில் சில பொருட்கள் தீங்கு விளைவிக்கும் வேதி பொருட்களால் தயாரிக்கப்படுகின்றன . 3.பிளாஸ்டிக் பொருட்களுக்கு பதிலாக துருபிடிக்கத எக்கு ,பேப்பர் பை போன்றவற்றை பயன்படுத்தலாம். 4. பிளாஸ்டிக் பொருட்களை மறுசுழற்சி செய்வதன் மூலம் சுற்றுசூழலுக்கு பாதிப்பு ஏற்படுவதை குறைக்கலாம் . 5. பிளாஸ்டிக் பொருட்களை வாங்குவதற்கு முன் பார்த்து வாங்குவது மிகவும் முக்கியம் . 6. பிளாஸ்டிக் பொருட்களுக்கு பதில் மரத்திலான , உலோகத்திலான மற்றும் பேப்பர் பொருட்களை பயன்படுத்துவதினால் உடல் நல பாதிப்பை குறைக்கலாம்.					

7. பிளாஸ்டிக் பைகளில் சூடான மற்றும் குளிர்வான பானங்களை சேகரிக்க பிளாஸ்டிக் பைகளை பயன்படுத்தகூடாது 8. பிளாஸ்டிக் கழிவுகள் உலகம் வெப்பமயமாதலுக்கு காரணமாகிறது 9. உணவு பொருட்களை பிளாஸ்டிக் டப்பாக்களில் போட்டு குளிர்சாதனபெட்டியில் வைக்ககூடாது . 10. பிளாஸ்டிக் பொருட்களை பயன்படுத்துவது கருச்சிதைவை ஏற்படுத்தும். 11. கண்டிப்பான விதிமுறைகள் பிளாஸ்டிக் பயன்பாட்டினை குறைக்கும். 12. பிளாஸ்டிக் வேதிப்பொருள் குழந்தைகளின் வளர்ச்சியினை பாதிக்கிறது.					

COMPUTER ASSISTED INSTRUCTION

ON

HAZARDS OF USE OF PLASTIC PRODUCTS

TOPIC : HAZARDS OF USE OF PLASTIC PRODUCTS.

INSTRUCTION MEDIA : COMPUTER ASSISTED INSTRUCTION.

GROUP : EIGHRH STANDARD RURAL SCHOOL CHILDREN.

TIME :

PLACE :

GENERAL OBJECTIVE:

At the end of the instruction the students of rural school children may gain knowledge about the plastics and their products uses and effects to environment and health &the preventive measures of plastic hazards . They may change their attitude about the plastic product usage and they are reduce to use the plastic products.

SPECIFIC OBJECTIVES:

At end of the instruction,

- explain about the plastic and plastic products.
- explain the effects of plastics on human health.
- explain the effects of plastics on environment.
- list down the recycling code of plastics.
- enlist the preventive measures of plastic hazards.

S. no	Duration	Specific objectives	Content	Teachers activities	Learners activities
1.	2mts		**INTRODUCTION :** A simple walk on any beach, any where , & the plastic waste spectacles is present. All over the world the statistics are ever growing ,staggeringly. Tons &ton of plastic debris is discarded every year . the plastic debris are waste that can vary in size from large containers, fishing nets microscopic plastic pellets or even particles they are discarded every year, every where,polluting lands ,rivers ,coasts ,beaches and oceans .last year an estimated 1,50,000 tons of marine plastic debris ended up on the shores of Japan and 300 tons a day on Indian's coasts. The plastic products and materials are widely in our day to day life. The products which made up of chemicals and the plastic debris are made hazards to our health and environment.	Introduce the topic	Listening
2.	10mts	Explain about the plastic and plastic products.	**PLASTIC AN OVERVIEW:** The word plastic derives from the Greek (plasticos) means fit for moulding and (plastos) meaning moulded. It refers to their malleability or plasticity during manufacture that allow them to be cast , pressed or extruded into on enormous Variety of shapes plats , tubes, bottles ,boxes and much more. Plastic are typically polymers of high molecule weight , and may contain other	Explaining	Listening

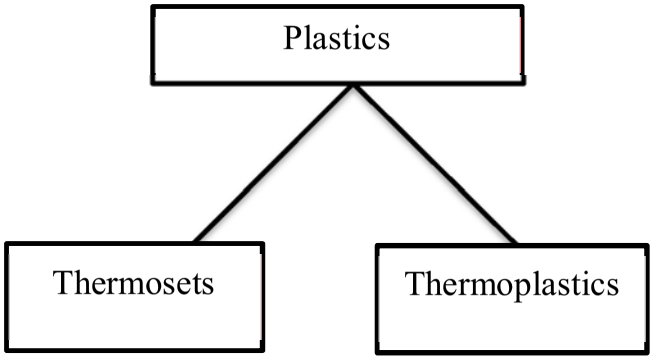
substances to improve the performance and reduce costs.

Plastics takes more time to degraded, they may also pollute the environment and affect our health.

HISTORY OF PLASTICS.:

The first human made plastic was invented by Alexander Parkes in 1855 . He called this plastic parkesine later called celluloid . the development of plastics has come from the use of natural plastic materials (e.g chewing gum, shellac) to the use of chemically modified natural materials (e.g rubber , nitrocellulose , collagen , gallant) and finally to c completely synthetic molecules (e.g Bakelite epoxy , polyvinyl chloride , poly ethylene.) make up the polymers backbone and side chain . Plastic can be classified by the chemical process used in their synthesis . other classification based on that are relevant for manufacture or product design.

TYPES OF PLASTICS:



			THERMOPLASTIC: Thermoplastics will soften and melts if enough heat is applied . Example: Polyethylene, polystyrene ,PTFE. **THERMOSETS:** Thermosets do not soften or melt no matter how much heat is applied. Examples: Polyester, Amino ,Epoxies , Phenolic, Polyimides, Polyurethane, silicone. **THERMOSET PLASTIC TYPES:** **ALKYDS:** Alkyds and chemically modified alkyd resins are the condensation products of poly basic acids and Polyhydric alcohols. They are also oil-modified polyesters because of the presence of vegetable or marine oil or other fatty acids. They are used in the architectural coating ,automotive under body and under- hood coting ,coil coatings , drum, and metal container coating ,electrical industry ,paints. **UREA FORMALDEHYDE &MELAMINE FORMALDEHYDE / AMINO:** Urea formaldehyde are strong ,glossy and durable. They are high mechanical strength ,fire, heat resistance ideal numerous industrial and household application . **EPOXIES:** Epoxy resins are low molecular weight polymers or higher molecular weight . The application for epoxy based materials are extensive and include coatings, adhesives,		

			electrical insulating paints and coating. **PHENOLICS:** The phenolic are combined formaldehyde and phenol .The material called Bakelite . They are water and solvent resistant , could be used as electrical insulator , electronics and telephones ,radios ,records. **PLOYMIDES:** Polyimides are the macromolecule with repeating units of linked by amino bonds when compared to most other organic or polymeric exceptional combination of thermal stability, mechanical toughness chemical resistance used in aircraft parts , wear ships, thrust washers . **POLYURETHENE :** They are durable elastomers and high performance adhesives and sealants ,fibres, seats , gaskets also called as urethanes. **SILICONE:** Silicone are polymers that include any inert ,synthetic compound made up of reparative units of Silicones. They are typically heat resistance and rubber-like and are used in sealants ,adhesives, lubricants medicine cooking utensils and thermal and electrical insulation.		

			THERMOPLASTICS: **POLYVINYL CHLORIDE (PVC):** PVC has side chains incorporating chlorine atoms, which form strong bonds . PVC can also be softened with chemical processing ,and in this form it is now used for shrink – wrap , food packaging and rain gear. **POLYSTYRENE:** Polystyrene is a rigid ,brittle inexpensive plastic that has been used to make plastic model kits and similar knick – knocks .It would also be the basis for one of the most popular “foamed” plastics ,under the name styrene foam or Styrofoam. **NYLON:** Nylon are the very strong ,nylon can be machined and will take a fine thread .It is also slippery and can be used to make washers , spacers and bushes. Nylon was originally developed as a textile but is available in many vastly different properties .Engineering nylon grades are easy to machine with good resistance to biological attack . unfortunately nylons can absorb moisture from the atmosphere and can degrade in strong sunlight ,unless a stabilising chemical is added at the initial manufacture of the plastics . Nylons are easy to mould . Nylon are used for everything form clothes through to gears and bearings.		

			POLYETHYLENE:(LDPE&HDPE) Some times known as polythene , was discovered in 1933 by Reginald Gibson and Eric Fawcett at the British Industrial Giant Imperial Chemical Industries . The most common polymer in plastic is polyethylene , which is made from ethylene monomers (CH2=CH2). Today ,we call is low density polyethylene and high density polyethylene .Polyethylene are cheap flexible durable, and chemically resistance LDPE is used to make films and packaging materials ,while HDPE is used for containers ,plumbing and automotive fitting . **POLYPROPYLENE:** In 1953 Karl Ziegler and Giulio Natta , Working independently ,prepared polypropylene from propylene monomers CH2=CHCH3) and received the Nobel Prize in chemistry in 1963. The various forms of polypropylene have different melting points and hardness .Polypropylene is similar to its ancestor ,polyethylene and shares polyethylene's low cost ,but is much more robust .It is used in everything from the plastic bottles to carpets to plastic furniture ,and is very heavily. **POLYETHYLENE TERPHTHALATE :** John Rex Whinfield invented a new polymer in 1941 when he condensed ethylene		

			glycol with terephthalate acid . The condensate was polyethylene terephthalate . PET is a thermoplastic that can be drawn into fibres and films .It's the main plastic in zip lock food storage bags. **TEFLON:** Teflon was made in 1938 by DuPont .It's created by polymerization of tetrafluroethylene molecules. The polymers are stable ,heat resistant ,strong to many chemicals and has a nearly frictionless surface .Teflon is used in plumbing tape , cookware , tubing ,waterproof coatings ,films and bearings.		
3.	15mts	Explain the effects of plastics on human health.	**EFFECTS ON PLASTIC ON HEALTH:** Plastics are everywhere some are the eco friendly and appear to be very safe for kids . Most are the made from non-renewable petroleum ,much of which needs to be imported .Some plastic cause dangers pollution during manufacturing , and some contain chemicals suspected of causing harm-especially to the kids and the children. Turning to adverse effects of plastic on the human population , there Is a growing body of literature on potential health risks .A range of chemicals that are used in the manufacture of plastics are known to be toxic. The bio monitoring approach has demonstrated phthalates and biphenyl -A as well as other additives in plastics and their metabolites , are present in the human population. Some compounds leaching from the polystyrene food containers have been	Explaining	Listening

			proposed to interfere with hormone functions and are suspected of potential concern include alkyphenols. **PHTHALATE:** Phthalate are chemicals used in many plastic to make them soft or flexible ,ie. plasticizers. They are widely used in plastic products inthr food and construction industries ,they are used extensively in beauty products ,pesticides ,wood finishes ,insect repellents, solvents and lubricant's. They are a number of phthalate with different through often overlapping health effects. Scientists have been able to measure phthalate level in human tissues for just a few years ,studies have shown that most Americans have phthalates in their urine and that all of us are exposed to phthalates from such ubiquitous sources as air , water and soil as well as from foods. People who undergo medical procedure are exposed to especially high levels since phthalate can leach out of plastic medical supplies.Infants and children's are found to have higher levels than the adults . **Premature breast development:** Young girls are highest known incidence of premature breast development in the world . Phthalate like DHEP that mimic the oestrogen levels could be the cause of premature development of breast.		

			Asthma: Rates of asthma have been rising over recent decades, phthalates found in vapour from in indoor air and in house dust might be an important factor . **Pregnancy /miscarriage :** Decreased rates of pregnancy and higher rates of miscarriage have been found in a study of female exposed long –term to high levels of phthalates .Another study in women living near a plastics manufacture reported that pregnancy complication correlated with higher levels of phthalates in the women's urine. Just everyday breathing seems to be an important route of exposure to phthalate in pregnant women living in cities. **BISPHENOL-A:** Bisphenol -A is the chemical name for a building block of "polycarbonate" plastics. common polycarbonate products include 5-gallon water bottle's, baby bottles and plastic lacquer that lines many food cans. Concerns about the possible health effects of biphenol –A stem from its oestrogenic activity together with reports that it can might from the plastic into the liquids or foods stored inside. Children who are have higher levels of bisphenol-A a chemical previously used in many products for kids ,like baby bottle and plastic toys ,had a higher odds of obesity and		

			adverse levels of body fat ,according to new study from University of Michigan researchers. The levels of BPA found in children's urine and then measured body fat, waist circumference and cardiovascular and diabetes risk factor ,in a study publishes in paediatrics. The study found that higher odds of obesity ,defined as a BMI above the 95th percentile on Centres for Disease Control and Prevention growth higher levels of urinary BPA. The children's have abnormal levels of cholesterol , insulin or glucose level. The study reviewed that about 3,300 kids aged 6-18 years, and found that children with high BPA levels tend to have excessive amounts of body fat &unusually expanded waistlines. They may also caused the behavioural problem like Attention Deficit Hyperactivity Disorder &Autism.		
4.	15mts	Explain the effects of plastics on environment	**EFFECTS OF PLASTIC ON ENVIRONMENT :** Modernization and progress has had its shares of disadvantages and one of the main aspects of concerns the main pollution is causing to the earth –be it land, air and water. With increasing the global population and the rising demand food and other essential , there has been a rise in the amount of water being generated daily by each household. The group at risk from the unscientific disposal of solid waste include the	Explaining	Listening

			population in areas where there is no proper waste disposal method , especially the children ,waste workers, and workers in facilities producing toxic and infectious materials In particular , organic waste poses a serious threats ,since they ferments, creating conditions favourable to the survival and growth of microbial pathogens . Direct handling of solid waste can result in various types of infectious and chronic disease with the waste workers and the rag pickers being the most vulnerable. Exposure to hazards waste can affect the human health , children being more vulnerable of these pollutants. Direct exposure can leads to disease through chemical exposure as the release of chemical waste into the environment leads to chemical poisoning. Waste from the industries can also cause serious health risks , other than this , co-disposal of industrial hazardous waste with municipal waste can expose people to chemical and radioactive hazards . Uncollected solid waste can also obstruct storm water runoff ,resulting in the forming of stagnant waste bodies that become the breading ground of disease.Waste dumped near water source also causes contamination of the water body or the ground water source .Direct dumping of untreated wasted in rivers sea and lakes results in the accumulation of toxic substances in the food chain through the plants and animals that feed on it. Disposal of hospital and other medical waste requires special attention since this can		

			create major health hazards .The waste like discarded syringe , bandages, are often disposed. The unhygienic use and disposal of plastics and its effects on human health . Most of the plastics are durable and degrade very slowly ;they vary in chemical bonds that make them so durable attend to make them resistant to most natural processes of degradation . Since 1950 ,one billion tons of plastic and some of that have been discarded material might persists for centuries or much longer. Serious environmental threats from plastic have been suggested in the light of the marine food chain along with many highly toxic chemical pollutant that accumulate in plastics. They also accumulate in larger fragmented pieces of plastic called nurdles . Estimated that 10% of modern waste was plastics , although estimate vary according to region –meanwhile, 50-80% of debris in mature areas is plastic. The effects of the plastic on global warming is mixed . the plastic are generally from the petroleum . I the plastic is incinerated , it increases carbon emissions if it is placed in the landfill , it becomes a carbon sinks although biodegradable plastic have caused methane emissions. Due to the lightness of plastic versus glass or metal ,plastic may reduce energy consumption . Industrial practices in plastic manufacture can lead to polluting effluents and the use of toxic intermediates , the exposure to which can be hazardous .Chlorinated plastic can		

			release harmful chemical into the surrounding soil, which can then seep into groundwater or other surrounding water sources and also the ecosystem . this can cause serious harm to the species that drink this water. Landfill areas are constantly piled high with many different types of plastics. In these landfill there are many microorganisms which spread up the biodegradable of plastics regarding, biodegradables plastics as they are broken down power full green gas that contributes significantly to global warming . **Ocean:** Nurdles are the plastic pellets (a type of micro plastic) that are shipped in to this form , after the in cargo ships to be used for the creation of plastic products A significant amount of nurdles are spilled in to ocean and it has been estimated that globally around 10% beach litter is nurdles . Plastic in ocean typically degrade within a year , but not entirely , and in the process toxic chemicals such as bisphenol-A and polystyrene can leach into water from some plastics. Polystyrene pieces and nurdles are the most common types of plastic pollution in oceans, and combined with plastic bags and food containers make up the majority of oceanic debris . **EFFECTS ON AN ANIMALS:** The plastic pollution has the potential to poison animals , which can been described		

<table>
<tr><td></td><td></td><td></td><td>as being highly determined to large marine mammals .
The plastic materials are ingested by the marine animals in vary among the animals .the animals typically starves ,because the accumulation of plastic that blocks the digestive tract.
The marine mammals are some times entangled the plastic items such as nets, water bottles ,which can harm or kill them.
The ingested of plastic materials can also affected the human by eating the marine animals like fish, crab.</td><td></td><td></td></tr>
<tr><td>5.</td><td>15mts</td><td>List down the recycling codes of plastic.</td><td>RECYCILNG CODES OF PLASTICS:
<table>
<tr><th>Recycling number</th><th>Images</th><th>Abbreviation</th><th>Polymer name</th><th>Uses</th><th>Recycling</th></tr>
<tr><td>1</td><td> 
</td><td>PETE or PET</td><td>Polyethylene terephthalate</td><td>Polyester fibres (Polar Fleece), thermoformed sheet, strapping, soft drink bottles, tote bags, furniture, carpet, panelling and (occasionally) new containers.</td><td>Picked up through most curb side recycling programs.</td></tr>
<tr><td>2</td><td> 
</td><td>HDPE</td><td>High-density polyethylene</td><td>Bottles, grocery bags, milk jugs, recycling bins, agricultural pipe, base cups, car stops, playground</td><td>Picked up through most curb side recycling programs,</td></tr>
</table></td><td>Explaining</td><td>Listening</td></tr>
</table>

							equipment, and plastic lumber	although some allow only those containers with necks.		
			3	 	PVC or V	Polyvinyl chloride	Pipe, fencing, shower curtains, lawn chairs, non-food bottles and children's toys.	Rarely recycled; accepted by some plastic lumber makers.		
			4	 	LDPE	Low-density polyethylene	Plastic bags, 6 pack rings, various containers, dispensing bottles, wash bottles, tubing, and various moulded laboratory equipment	LDPE is not often recycled through curb side programs, but some communities will accept it. Plastic shopping bags can be returned to many stores for recycling.		
			5		PP	Polypropylene	Auto parts, industrial fibres, food containers, and dishware	Number 5 plastics can be recycled through some curb side programs.		

										
			6		PS	Polystyrene	Desk accessories, cafeteria trays, plastic utensils, toys, video cassettes and cases, clamshell containers, packaging peanuts, and insulation board and other expanded polystyrene products (e.g., Styrofoam)	Number 6 plastics can be recycled through some curb side programs.		
			7		OTHER or O	Other plastics, such as acrylic, nylon, polycarbonate, and polylactic acid (bio plastic), and multilayer combinations of different plastics	Bottles, plastic lumber applications, Head light lenses, and safety shields/glasses.	Number 7 plastics have traditionally not been recycled, though some curb side programs now take them.		

6.	20mts	Enlist the preventive measures of plastic hazards.	**PLASTICS PRODUCTION ,USAGE, DISPOSAL AND WASTE MANAGEMENT SOLUTIONS:** Accumulation of plastic debris in the environment and the associated consequences are largely avoidable .Considerable immediate reductions in the quantity of waste entering in to natural environment ,as opposed to landfill , could be achieved by waste disposal and material management. Perhaps increasing the capacity to recycle will help to reverse this trend such that we start to regard end of life materials as valuable feedstock for new production rather than waste . Measures to reduce production of plastic by avoid to use and reduce to use of plastic products from oil here an example showing how small changes in product packaging required by 70% reusable plastic packing creates have reduced the packaging consumption of the same retailer by an estimated 30,000 tons per annum. From the waste management perspective the three 'R' s Reduce , Reuse ,and Recycle and they show to be effective we need to consider the three R's in combination with each other and together with the fourth 'R' energy Recovery . Indeed we also need to consider a fifth 'R' molecular Recover and Redesign. • Bring our own cloth bags to shopping. Ask our merchants to promote cloth	Explaining	Listening

			bags (change for plastic bags or provide incentive for cloth) • Encourage the bags made from the natural products such as corn starch and soy. • Buy drinks in the glass or aluminium containers 75% of aluminium are recycled only 36%of plastic are recycled. • A recent life cycle analysis calculated that use of 100% recycled PET rather than virgin PET to reduce plastic bottles could give a 27% o on CO2 emission. • Instead of plastic containers use such as stainless steel, aluminium ,glass for safe use. • Use drink and food storage container marked BPA –free . Look for the words "BPA –free" on the plastic bottles ,zippy cups and food containers for use.Use baby bottles made up of glass . • Avoid heating food and drink in plastic containers .Use ceramic utensils for microwave cooking. • Use the bio based plastic - Biobased plastics are plastics which are fully or partially made from renewable resources, often with the help of biotechnology, and encompass a range of different materials with different functionalities. Biobased plastics can be produced either in the plants themselves (for example		

			starch, cellulose), or through the polymerisation of plant-based sugars and oils (for example polylactic acid, polypropylene and polyethylene terephthalate). • Some plastics are fully biobased and may be biodegradable, such as starch and polyhydroxyalkanoates; some may be partially biobased and biodegradable such as polylactic acid and cellulose, whereas others may be partially biobased and non-biodegradable such as bio–polyethylene tetraphlate, bio-polypropylene and bio-polyethylene. Thus, whether a biobased plastic degrades or not is not a function of its biobased content, but a result of its unique physical properties. • It is estimated that between 85% of the plastics on the market today could be substituted by biobased plastics. Many biobased plastics could be processed using the same technologies as for fossil based plastics with some modifications to the processing parameters. • In 2011, 3.5 million tons of biobased polymers were produced worldwide, compared to 235 million tons of traditional, fossil based plastics. Biobased plastics have seen exponential growth rates in the past few years and projections for future growth are very positive, with some estimates suggesting that production may reach 12 million tons by 2020. • To date, the predominant market for biobased plastics has been in for		

			biodegradable applications, however, it is expected that non-biodegradable plastics or 'drop-ins' (such as polyethylene terephthalate, polypropylene and polyethylene) will become the predominant market for biobased plastics in the near future. • Biobased plastics contain renewable carbon. That is to say that the carbon contained within them has recently been taken from the atmosphere. So when this carbon is returned to the atmosphere at the end of the life of the bioplastics, it does not add to the amount of carbon within the atmosphere. • Some types of biobased plastics can be degraded through composting. This is a particular benefit for applications such as disposal cutlery and flexible food packaging where the plastics can be disposed of alongside food wastes. Biodegradable agricultural plastic mulches may also be simply ploughed into the field when needed, saving the need for collection and storage of plastics. • Other types of bioplastics, known as 'drop-in' bioplastics such as biobased polyethylene terephthalate are chemically identical to fossil based plastics and can be recycled in the same way as their conventional counterparts. At the end of their life, when recycling is no longer an option, these materials can be combusted to produce renewable energy and/or be used to make biofuels. • Biobased plastics can reduce energy consumption and CO2 emissions		

			compared to fossil based plastics. For example, some types of polylactic acid made from maize starch use up to 50% less oil, and releases 60% fewer Greenhouse Gases (GHG's) to the atmosphere than traditional oil based plastics for the same applications. • In the future, industry expects that less energy will be needed and GHG emissions will fall as the production and end of life processes are optimised and new feedstock and more sustainable energy sources become available. • Biotechnology can develop better crops for plastics production either through improving crop genomes to enhance desirable characteristics such as a high cellulose content, or through the genetic modification of crops to produce biobased plastics (such as polyhydroxyalkanoates) in the plant themselves. • Currently, most biobased plastics are derived from food-based sugars such as those derived from sugar cane or cereal crops. The use of non-food based biomass would be beneficial in overcoming any fears surrounding the use of food for industrial materials. Novel enzymes and microorganisms, developed through industrial biotechnology, can play a crucial role not only in maximising the efficiency of biomass breakdown and sugar release, but also the conversion of these sugars and carbon to biobased plastics. This, in turn, will make these plastics even more eco friendly.		

			• Finally, industrial biotechnology is a critical facilitating technology for the development of biobased plastics with novel functionalities, tailored to specific applications. • See the recycling code of plastic before buying the products. The symbol code are in the bottom of the plastic products. • It is use to reduce the risk minimize the hazards of plastic. The recycling codes are from the 1,2,3,4,5,6 & 7. • See the toys and things for children before buying . the international standard symbol on toys indicate a higher chemical safety standard symbol like , CE. • Safer plastic are # 1PET,#2HDPE,#4LDPE and #5 PP. • #1 PET is best known for its high recycling ,that #2HDPE another commonly recycled plastics. • #4 LDPE and #5PP although not as widely recycled are also god choices since as with #2HDPE ,most research study has not shown leaching any carcinogens. • Avoid soft vinyl toys and other vinyl products.		